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Microfinance Services and the Growth of Women-Owned Businesses in Selected Niger Delta States in Nigeria

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Abstract: This study investigates the effect of microfinance services on the growth of women-owned businesses in selected Niger Delta states, Nigeria. Using a cross-sectional survey design, primary data were collected from 435 women entrepreneurs selected from a sample of 442 through a structured questionnaire. The study examined the influence of access to microcredit, entrepreneurship training, savings services, business advisory services, insurance services, and digital financial services on business growth. Descriptive statistics were used to summarize respondents' characteristics, while Binary Logit regression was employed to estimate the determinants of business growth, with the Binary Probit model used as a robustness check. The results indicate that access to microcredit, entrepreneurship training, savings services, business advisory services, and digital financial services significantly increase the probability of business growth, whereas insurance services have a positive but statistically insignificant effect. The Probit estimates closely mirror the Logit results, confirming the robustness of the findings across alternative model specifications. The study concludes that integrating financial and non-financial microfinance services is critical for enhancing the growth and sustainability of women-owned businesses. It recommends expanding access to affordable credit, strengthening entrepreneurship development programmes, and accelerating digital financial inclusion to improve the performance of women-owned enterprises and promote inclusive economic development in the Niger Delta region.

Keywords: Microfinance Services, Women-Owned Businesses, Business Growth, Binary Logit, Binary Probit, Niger Delta, Nigeria.

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1. Introduction

Women's entrepreneurship has become an important driver of inclusive economic growth, employment generation, poverty reduction, and household welfare in developing economies. Women-owned businesses contribute significantly to economic diversification by creating employment opportunities, increasing local production, and improving family incomes. Despite these contributions, women entrepreneurs continue to face significant challenges, including limited access to finance, inadequate business skills, poor infrastructure, weak market linkages, and restrictive socio-cultural norms, all of which constrain business growth [1], [2]. These challenges are particularly evident in

sub-Saharan Africa, where women dominate the micro, small, and medium enterprise (MSME) sector but remain financially excluded from formal banking services [3].

Access to finance remains one of the most critical determinants of enterprise growth. Conventional financial institutions often impose stringent collateral requirements, high lending costs, and complex lending procedures that restrict women's access to formal credit. Consequently, many women entrepreneurs depend on informal financing sources that are inadequate for business expansion and sustainability [4], [2]. In response to this financing gap, microfinance institutions (MFIs) have emerged as important vehicles for promoting financial inclusion by providing microcredit, savings facilities, insurance products, entrepreneurship training, financial literacy programmes, and business advisory services tailored to low-income entrepreneurs [5], [6], [7].

Theoretically, access to financial and non-financial microfinance services enables entrepreneurs to acquire productive assets, improve managerial skills, expand business operations, and enhance enterprise performance [8], [9], [10]. However, empirical evidence on the effectiveness of microfinance remains inconclusive. While several studies have reported positive effects on women's entrepreneurial performance, income, and empowerment, others have found limited impacts due to inadequate loan sizes, high interest rates, weak institutional support, and macroeconomic instability [11], [12], [13].

In Nigeria, women constitute a substantial proportion of the informal business sector, yet many continue to experience financial exclusion despite various financial inclusion initiatives introduced by the government and the Central Bank of Nigeria. These challenges have been exacerbated by inflation, exchange rate volatility, and rising business operating costs, which have negatively affected the survival and growth of women-owned enterprises [14], [15]. The situation is particularly pronounced in the Niger Delta region, where women play active roles in trading, agriculture, fisheries, food processing, and other microenterprises but continue to face limited access to affordable finance and business support services [16], [17].

Although microfinance institutions have expanded their operations across the Niger Delta by providing credit, savings, insurance, entrepreneurship training, financial advisory, and digital financial services, empirical evidence on the effectiveness of these integrated services in promoting the growth of women-owned businesses remains limited. Most previous studies have focused on microcredit, poverty reduction, or women's empowerment and have largely examined individual states or communities, with little attention given to the combined effects of multiple microfinance services on business growth across the Niger Delta region.

Against this background, this study examines the effect of microfinance services on the growth of women-owned businesses in selected Niger Delta states. Specifically, it investigates how access to microcredit, entrepreneurship training, savings services, business advisory services, insurance products, and digital financial services influence the likelihood of business growth. The findings are expected to provide useful evidence for policymakers, microfinance institutions, and development agencies in designing strategies that strengthen women's entrepreneurship and promote inclusive economic development in Nigeria.

1.1. Aim and Objectives of the Study

The main aim of this study is to examine the effect of microfinance services on the growth of women-owned businesses in selected Niger Delta states, Nigeria.

The specific objectives are to:

1. Examine the effect of access to microcredit on the likelihood of growth among women-owned businesses in selected Niger Delta states.

2. Assess the influence of non-financial microfinance services (such as entrepreneurship training, business advisory services, and financial literacy programmes) on the likelihood of business growth among women-owned enterprises.
3. Evaluate the effect of financial inclusion services provided by microfinance institutions (including savings, insurance, and digital financial services) on the probability of growth among women-owned businesses in selected Niger Delta states.

1.2. Hypotheses

The corresponding hypotheses are:

H₀₁: Access to microcredit has no statistically significant effect on the likelihood of growth among women-owned businesses in selected Niger Delta states.

H₀₂: Non-financial microfinance services have no statistically significant effect on the likelihood of growth among women-owned businesses in selected Niger Delta states.

H₀₃: Financial inclusion services provided by microfinance institutions have no statistically significant effect on the probability of growth among women-owned businesses in selected Niger Delta states.

The relationship between microfinance services and the growth of women-owned businesses has attracted considerable theoretical attention in the fields of development economics, entrepreneurship, and financial inclusion. Several theories have been advanced to explain how access to financial services influences entrepreneurial behaviour and business performance. This study is anchored on three complementary theories: the Financial Intermediation Theory, the Resource-Based View (RBV) Theory, and the Women's Empowerment Theory. These theories collectively explain how financial and non-financial microfinance services enhance the growth potential of women-owned businesses.

Financial Intermediation Theory. The Financial Intermediation Theory was pioneered by Gurley and Shaw [18] and later expanded by Diamond [19], Diamond and Dybvig [20], and Allen and Gale [21]. The theory explains the role of financial institutions in mobilizing savings from surplus units and channeling them to deficit units for productive investment. Financial intermediaries improve resource allocation by reducing transaction costs, minimizing information asymmetry, diversifying risks, and addressing credit market imperfections such as adverse selection and moral hazard [18], [19], [22].

Within this framework, microfinance institutions function as specialized financial intermediaries that provide accessible financial services to individuals who are often excluded from conventional banking. Through flexible lending arrangements, savings mobilization, insurance, entrepreneurship support, and digital financial services, microfinance institutions enable women entrepreneurs with limited collateral to access the resources needed to establish and expand their businesses [5], [6].

The theory is particularly relevant to women-owned businesses because women often face greater financial exclusion arising from limited collateral ownership, discriminatory lending practices, and socio-cultural barriers [3], [2]. By easing these financial constraints, microfinance institutions improve access to productive capital, thereby enhancing business investment, expansion, employment creation, and profitability. However, critics argue that the theory places greater emphasis on financial capital while overlooking other determinants of enterprise growth, such as entrepreneurial skills, institutional quality, and macroeconomic conditions [23]. Nevertheless, the Financial Intermediation Theory provides the principal theoretical foundation for this study by explaining how access to microfinance services can increase the likelihood of growth among women-owned businesses.

Resource-Based View (RBV) Theory. The Resource-Based View (RBV) Theory was proposed by Birger Wernerfelt [24] and later refined by Jay Barney [25]. The theory posits that firms achieve sustainable competitive advantage through the possession and

effective utilization of valuable, rare, inimitable, and non-substitutable (VRIN) resources. According to Barney [25], superior business performance depends more on a firm's internal resources and capabilities than on external market conditions.

In the context of women entrepreneurship, these resources include not only financial capital but also managerial skills, entrepreneurial knowledge, technological competence, business experience, social networks, and innovation capacity [25], [26]. Microfinance institutions enhance these resources by providing both financial and non-financial services, including credit, savings products, entrepreneurship training, financial literacy, mentoring, and business advisory services, which improve entrepreneurs' capacity to manage and expand their businesses [6], [9].

The RBV is particularly relevant to women-owned businesses because many women entrepreneurs operate with limited financial and managerial resources. By strengthening both tangible and intangible resources, microfinance services enhance enterprise competitiveness and growth potential. However, the theory has been criticized for giving limited attention to external factors such as government policies, macroeconomic conditions, infrastructure, and institutional quality, which also influence business performance [27]. Despite this limitation, the RBV provides a useful framework for explaining how microfinance services build the capabilities required for the sustainable growth of women-owned businesses.

Women's Empowerment Theory. Women's Empowerment Theory was developed by Naila Kabeer [28], who defined empowerment as the process through which individuals gain the ability to make strategic life choices. According to Kabeer, empowerment comprises three interrelated dimensions: resources, agency, and achievements. Resources include material, human, and social assets; agency refers to the ability to make decisions and pursue goals; while achievements represent the outcomes of effectively utilizing available resources.

In the context of entrepreneurship, empowerment extends beyond income generation to encompass increased control over productive resources, financial independence, business ownership, and participation in economic decision-making [28]. Microfinance institutions promote this empowerment by providing credit, savings facilities, insurance products, entrepreneurship training, financial education, and business advisory services, thereby enhancing women's confidence, financial capability, and capacity to expand their businesses [29].

Empirical evidence suggests that microfinance contributes positively to women's business ownership, income generation, financial inclusion, and household decision-making [1], [3], [30]. However, critics argue that empowerment outcomes may be limited by socio-cultural norms, gender discrimination, institutional weaknesses, and heavy loan repayment obligations [31]. Despite these challenges, the Women's Empowerment Theory remains relevant to this study because it explains how access to microfinance services can strengthen women's entrepreneurial capacity and enhance the growth of women-owned businesses.

AbdulKareem [32] investigated the role of microfinance in promoting women's economic empowerment in Nigeria, with particular emphasis on both income and non-income dimensions of empowerment. The study was conducted among 400 women clients of 29 microfinance banks in Kwara State using a multi-stage sampling technique. Primary data were collected through structured questionnaires, while the Generalized Ordered Logit regression model was employed for data analysis. The findings revealed that microfinance services, particularly loans, savings, training, and the duration of banking relationships, significantly improved women's income, whereas savings, training, insurance, and loan frequency positively influenced non-income empowerment indicators such as financial decision-making and control over resources. The study concluded that microfinance institutions contribute substantially to women's economic

empowerment, although the magnitude of the impact differs across empowerment dimensions.

Anam et al. [33] examined the contribution of microfinance services to the promotion of women entrepreneurs using Alache Microfinance Bank in Cross River State, Nigeria, as a case study. The study adopted a descriptive survey research design, administering structured questionnaires to women entrepreneurs who were beneficiaries of the bank's services. Descriptive statistics were used to analyse the collected data. The findings indicated that access to microcredit, savings facilities, entrepreneurship training, and business advisory services significantly enhanced business operations, income generation, and entrepreneurial activities among women. The authors concluded that comprehensive microfinance services are essential instruments for strengthening women-owned enterprises and reducing poverty.

Nkamnebe and Oladipo [34] investigated the impact of microcredit on the income and social status of rural women microentrepreneurs in Southeast Nigeria. The study covered four states in the Southeast geopolitical zone and surveyed 340 women beneficiaries of microcredit programmes using a quantitative research design. Data were analysed using descriptive statistics and inferential analytical techniques. The results showed that access to microcredit significantly increased business income, improved household welfare, and enhanced the social status of rural women entrepreneurs. However, the study also identified challenges relating to inadequate loan sizes and high repayment obligations. The researchers concluded that while microcredit contributes positively to women's entrepreneurial development, supportive financial policies are required to maximize its effectiveness.

Ogundana [35] examined financing mechanisms among women entrepreneurs in Nigeria with emphasis on informal financing arrangements. The study utilised data obtained from 200 women entrepreneurs and applied the fuzzy-set Qualitative Comparative Analysis (fsQCA) methodology to identify different financing configurations influencing entrepreneurial outcomes. The findings revealed that informal financing mechanisms, particularly rotating savings associations (Ajo), remain important sources of business capital because many women continue to experience barriers in accessing formal financial services. The study concluded that both formal microfinance services and informal financing arrangements complement each other in supporting women-owned enterprises and should be integrated into entrepreneurship development policies.

Nwankwo and Otaokpukpu [36] investigated the effects of microfinance on the growth of micro and small enterprises in Southeast Nigeria. The study employed panel survey data obtained from 502 enterprises financed by microfinance banks across the region. Multiple regression analysis was adopted to estimate the relationship between loan characteristics and enterprise growth. Contrary to many previous studies, the findings revealed that access to microfinance loans alone did not significantly enhance enterprise growth because of relatively small loan sizes, high interest rates, and unfavourable repayment conditions. The authors concluded that improving the design and delivery of microfinance products is necessary before substantial business growth can be achieved.

Solomon and Hussaini [37] examined the effect of financing options on the performance of women-owned micro and small-scale businesses in Nasarawa State, Nigeria. The study surveyed 328 women entrepreneurs using purposive sampling techniques and employed Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyse the data collected through structured questionnaires. The results indicated that financing obtained through personal savings, family support, cooperatives, and microfinance institutions significantly improved business performance, growth, and survival. The study concluded that women entrepreneurs should diversify

their financing sources while policymakers should strengthen access to affordable microfinance facilities.

Abubakar and Isa [38] investigated the contribution of microfinance banks to women's entrepreneurial enhancement in Northwestern Nigeria. The study adopted a survey research design involving 259 women entrepreneurs who were clients of microfinance banks. Data were analysed using descriptive statistical techniques. The findings showed that women entrepreneurs were highly aware of microfinance products and services and generally perceived loan accessibility, savings products, and other financial services as beneficial to business development. The study concluded that microfinance banks play an important role in improving women's entrepreneurial capacity, reducing poverty, and promoting enterprise sustainability in the region.

Diaka and Asenge [39] examined the effect of microfinance banks on the performance of selected women-owned enterprises in Makurdi Metropolis, Benue State. The study employed a survey research design, collecting primary data through structured questionnaires administered to women entrepreneurs who were customers of selected microfinance banks. The analysis focused on the effects of loan services, savings services, and entrepreneurship training on business performance. The findings demonstrated that all three dimensions of microfinance services significantly improved enterprise performance, particularly in terms of profitability, business expansion, and operational efficiency. The study concluded that integrating financial and non-financial services enhances the performance and long-term sustainability of women-owned businesses.

1.3 Research Gap

The empirical literature demonstrates considerable evidence that microfinance services positively influence women's entrepreneurship, business performance, financial inclusion, and economic empowerment. However, important gaps remain. First, most existing studies have focused on women's empowerment, poverty reduction, or enterprise performance rather than specifically examining the growth of women-owned businesses as a binary outcome suitable for Logit or Probit estimation. Second, many studies concentrated on single states or specific institutions such as Kwara, Cross River, Benue, Nasarawa, or the Southeast, thereby limiting the generalizability of their findings to the Niger Delta region. Third, while several studies assessed microcredit alone, relatively few simultaneously examined the combined effects of credit services, savings services, entrepreneurship training, business advisory services, insurance, and digital financial services on business growth. Fourth, previous studies predominantly employed descriptive statistics, multiple regression, or structural equation modelling, whereas limited empirical evidence has utilized binary choice models (Logit or Probit) to estimate the probability that women-owned businesses experience significant growth following access to microfinance services. This study seeks to address these gaps by examining the effects of multiple dimensions of microfinance services on the likelihood of business growth among women-owned enterprises across selected Niger Delta states using an appropriate binary response model.

2. Materials and Methods

2.1. Research Design

This study adopts a cross-sectional survey research design. The survey design is appropriate because the study seeks to obtain first-hand information from women entrepreneurs regarding their access to microfinance services and the growth of their businesses at a specific point in time. The design enables the collection of quantitative data from a relatively large number of respondents and facilitates the examination of the relationship between microfinance services and the likelihood of business growth. Furthermore, the survey design is suitable for studies employing binary response models

such as the Logit or Probit model, where the objective is to estimate the probability of an event occurring based on a set of explanatory variables [40], [41].

2.2. Area of the Study

The study is conducted in selected states within the Niger Delta region of Nigeria. The Niger Delta comprises nine states, namely Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers. However, this study focuses on Bayelsa, Rivers, and Delta States, which have relatively high concentrations of women-owned micro and small enterprises and vibrant microfinance activities.

The selected states possess substantial commercial activities in retail trading, agriculture, fisheries, food processing, fashion, hospitality, transportation, and other small-scale enterprises where women constitute a significant proportion of business owners. Despite their entrepreneurial activities, women in these states continue to face challenges relating to limited access to finance, inadequate business support services, poor infrastructure, and macroeconomic instability. These characteristics make the selected states suitable for examining the influence of microfinance services on the growth of women-owned businesses.

2.3. Population of the Study

The target population comprises registered women-owned micro and small enterprises operating in Bayelsa, Rivers, and Delta States.

Specifically, the population consists of women entrepreneurs registered with the respective State Ministries of Commerce and Industry, Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), Corporate Affairs Commission (CAC), recognized business associations, and women entrepreneur groups operating within the selected states.

2.4. Sample Size Determination

The sample size is determined using the Cochran [42] formula for an unknown or large population:

$$n = \frac{Z^2 pq}{e^2}$$

n = Sample size

Z = Standard normal deviation (1.96 at 95% confidence level)

p = Estimated proportion (0.50)

q = (1 - p)

e = Margin of error (0.05)

Thus,

$$\begin{aligned} n &= \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} \\ n &= \frac{3.8416(0.25)}{0.0025} \\ n &= 384.16 \end{aligned}$$

To accommodate possible non-response, incomplete questionnaires, and data cleaning, an additional 15% is added:

$$384 + 58 = 442$$

2.5. Sampling Technique

This study adopts a multi-stage sampling technique to select the respondents. First, Bayelsa, Rivers, and Delta States are purposively selected due to their high concentration of women-owned businesses and the active presence of microfinance institutions. Thereafter, major commercial centres within each state are identified, and lists of registered women-owned enterprises are obtained from relevant agencies and business

associations. Finally, a simple random sampling technique is employed to proportionately select 442 women entrepreneurs who have accessed microfinance services, thereby ensuring that every eligible respondent has an equal chance of being included in the study.

2.6. Sources of Data and Measurement of Variables

This study relies primarily on primary data obtained through a structured questionnaire administered to women entrepreneurs who have accessed microfinance services in the selected Niger Delta states. The questionnaire is designed to collect information on respondents' demographic characteristics, access to microfinance services, and business growth. Secondary data are sourced from relevant textbooks, peer-reviewed journal articles, government publications, reports of the Central Bank of Nigeria (CBN), the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), the World Bank, and other credible publications to support the theoretical and empirical aspects of the study.

The dependent variable is business growth, measured as a binary outcome, where a value of 1 indicates that a woman-owned business has experienced significant growth (such as increased sales, profits, employment, or business expansion) over the past three years, and 0 otherwise. The explanatory variables include access to microcredit, entrepreneurship training, savings services, business advisory services, insurance services, and digital financial services, while age, educational level, business age, and business size are included as control variables to account for other factors that may influence business growth. This measurement approach is appropriate for estimating the probability of business growth using the Binary Logit and Probit models.

2.7. Model Specification

Given that the dependent variable is binary, the study adopts the Binary Logit Model.

The Logit model is specified as:

$$P(Y_i = 1) = \frac{1}{1 + e^{-Z_i}} \quad (1)$$

$$Z_i = \beta_0 + \beta_1 AMC + \beta_2 ENT + \beta_3 SAV + \beta_4 BAS + \beta_5 INS + \beta_6 DFS + \beta_7 AGE + \beta_8 EDU + \beta_9 BAGE + \beta_{10} BSIZE + \mu \quad (2)$$

where:

BG = Business Growth

AMC = Access to Microcredit

ENT = Entrepreneurship Training

SAV = Savings Services

BAS = Business Advisory Services

INS = Insurance Services

DFS = Digital Financial Services

AGE = Age of Entrepreneur

EDU = Educational Level

BAGE = Business Age

BSIZE = Business Size

μ = Error term

For robustness, the Binary Probit Model was also estimated.

The Probit model is expressed as:

$$P(Y_i = 1) = \Phi(\beta X_i) \quad (3)$$

Φ represents the cumulative normal distribution function.

The Logit and Probit models are appropriate because they estimate the probability that a woman-owned business experiences growth following access to microfinance services.

2.8. Method of Data Analysis

The data collected for this study were coded and analyzed using Stata version 18. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the respondents' characteristics and the extent of access to microfinance services. The hypotheses was tested using the Binary Logit model, while the Binary Probit model was estimated as a robustness check to validate the findings. The results were interpreted using coefficient estimates, marginal effects, Wald Chi-square statistics, Likelihood Ratio (LR) Chi-square, Pseudo R², and corresponding p-values. All hypotheses were tested at the 5% level of significance, with the null hypothesis rejected where the p-value is less than 0.05.

3. Results and Discussion

Out of the 442 questionnaires administered to women entrepreneurs across the selected Niger Delta states, 435 were properly completed and returned, representing a 98.4% response rate, while 7 questionnaires (1.6%) were either not returned or were discarded due to incomplete responses. The high response rate is considered adequate for statistical analysis and enhances the reliability of the study findings.

3.1. Demographic Characteristics of the Respondents

The demographic characteristics of the respondents were analyzed using descriptive statistics to provide insights into their socio-economic profiles. The variables considered include age, marital status, educational qualification, business experience, business sector, and state of residence. The results are presented in Table 1.

Table 1: Demographic Characteristics of the Respondents (N = 435)

Variable	Category	Frequency	Percentage (%)
Age (Years)	20–29	62	14.3
	30–39	148	34.0
	40–49	136	31.3
	50 years and above	89	20.4
	Total	435	100.0
Marital Status	Single	86	19.8
	Married	271	62.3
	Divorced	31	7.1
	Widowed	47	10.8
	Total	435	100.0
Educational Qualification	Primary Education	41	9.4
	Secondary Education	133	30.6
	Diploma/NCE	76	17.5
	Bachelor's Degree/HND	149	34.3
	Postgraduate Degree	36	8.2
	Total	435	100.0
Business Experience	Less than 3 years	74	17.0
	3–5 years	123	28.3
	6–10 years	146	33.6
	Above 10 years	92	21.1

	Total	435	100.0
Business Sector	Trading	171	39.3
	Agriculture/Fisheries	67	15.4
	Food Processing	59	13.6
	Fashion & Beauty	83	19.1
	Hospitality/Others	55	12.6
	Total	435	100.0
State of Residence	Bayelsa	138	31.7
	Rivers	151	34.7
	Delta	146	33.6
	Total	435	100.0

Source: Authors' computation from survey data using Stata 18.

The results in Table 1 show that the majority of the respondents (34.0%) were between 30 and 39 years of age, followed by those aged 40–49 years (31.3%), indicating that most women entrepreneurs were in their economically active and productive years. In terms of marital status, 62.3% of the respondents were married, suggesting that married women constituted the largest proportion of business owners surveyed. Regarding educational attainment, the largest proportion of respondents (34.3%) possessed a Bachelor's Degree or HND, followed by those with secondary education (30.6%), indicating a relatively educated entrepreneurial population capable of adopting financial and business innovations.

The findings further reveal that 33.6% of the respondents had operated their businesses for 6–10 years, while 28.3% had between 3 and 5 years of business experience, suggesting that most respondents had acquired sufficient entrepreneurial experience to assess the contribution of microfinance services to business growth. With respect to business sectors, trading accounted for the largest share (39.3%), followed by fashion and beauty enterprises (19.1%), reflecting the dominant nature of women-owned businesses within the study area. Finally, the respondents were fairly distributed across the selected states, with Rivers State accounting for 34.7%, Delta State 33.6%, and Bayelsa State 31.7%, thereby providing a balanced representation of women entrepreneurs in the selected Niger Delta states. These demographic characteristics indicate that the sample is sufficiently diverse and suitable for examining the influence of microfinance services on the growth of women-owned businesses.

3.2. Binary Logit Regression Results on the Effect of Microfinance Services on the Growth of Women-Owned Businesses

Table 2 presents the results of the Binary Logit regression model estimating the effect of microfinance services on the probability of growth among women-owned businesses in the selected Niger Delta states. The dependent variable, Business Growth (BG), is binary, where 1 = Business experienced significant growth and 0 = Otherwise.

Table 2: Binary Logit Regression Estimates of the Effect of Microfinance Services on Business Growth (N = 435)

Variables	Coefficient (β)	Std. Error	z-value	p-value	Odds Ratio (e^β)
Constant	-2.476	0.821	-3.02	0.003***	0.084
Access to Microcredit (AMC)	0.864	0.213	4.06	0.000***	2.373
Entrepreneurship Training (ENT)	0.592	0.181	3.27	0.001***	1.808
Savings Services (SAV)	0.431	0.169	2.55	0.011**	1.539
Business Advisory Services (BAS)	0.376	0.153	2.46	0.014**	1.457
Insurance Services (INS)	0.214	0.132	1.62	0.106	1.239
Digital Financial Services (DFS)	0.683	0.201	3.40	0.001***	1.980
Age (AGE)	0.027	0.015	1.80	0.072*	1.027
Educational Level (EDU)	0.295	0.104	2.84	0.005***	1.343
Business Age (BAGE)	0.183	0.071	2.58	0.010**	1.201
Business Size (BSIZE)	0.348	0.118	2.95	0.003***	1.416

Source: Authors' computation from survey data using Stata 18.

Table 3: Model Summary of the Binary Logit Model

Statistic	Value
Number of Observations	435
Log Likelihood	-191.384
LR Chi-square (10)	142.87
Prob > Chi-square	0.0000
McFadden Pseudo R ²	0.2718
Percentage Correctly Classified	82.3%
Hosmer–Lemeshow Chi-square	6.41
Prob > Hosmer–Lemeshow	0.601

Source: Authors' computation from survey data using Stata 18.

The overall Binary Logit model is statistically significant, as evidenced by the Likelihood Ratio (LR) Chi-square value of 142.87 ($p < 0.001$) shown in Table 3, indicating that the explanatory variables jointly explain the likelihood of business growth among women-owned enterprises. The McFadden Pseudo R² of 0.2718 suggests that approximately 27.2% of the variation in the probability of business growth is explained by the variables included in the model. The model also demonstrates good predictive performance, correctly classifying 82.3% of the observations. Furthermore, the Hosmer–Lemeshow goodness-of-fit test is not statistically significant ($p = 0.601$), indicating that the model fits the observed data adequately.

Among the explanatory variables, access to microcredit (AMC) has a positive and highly significant effect on business growth ($\beta = 0.864$, $p < 0.01$). The odds ratio of 2.373 implies that women entrepreneurs with greater access to microcredit are about 2.4 times more likely to experience business growth than those with limited access, holding other variables constant.

Entrepreneurship training (ENT) also exerts a positive and statistically significant influence on business growth ($\beta = 0.592$, $p < 0.01$). The odds ratio of 1.808 indicates that participation in entrepreneurship training increases the likelihood of business growth by approximately 81%, highlighting the importance of capacity-building programmes. Similarly, savings services (SAV) positively and significantly influence business growth ($\beta = 0.431$, $p < 0.05$). The estimated odds ratio of 1.539 suggests that entrepreneurs who

actively utilize savings products are more likely to achieve business growth than those who do not.

The coefficient for business advisory services (BAS) is positive and statistically significant ($\beta = 0.376$, $p < 0.05$), indicating that advisory support enhances managerial decision-making and increases the probability of enterprise growth. The odds ratio of 1.457 implies that businesses receiving advisory services are approximately 46% more likely to grow.

Although insurance services (INS) have a positive coefficient ($\beta = 0.214$), the variable is not statistically significant ($p = 0.106$). This suggests that, within the study area, access to micro-insurance does not significantly influence the likelihood of business growth, possibly due to low awareness, limited patronage, or inadequate insurance coverage among women entrepreneurs.

Digital financial services (DFS) have a positive and highly significant effect on business growth ($\beta = 0.683$, $p < 0.01$). The odds ratio of 1.980 indicates that women entrepreneurs using digital financial platforms are nearly twice as likely to experience business growth compared to those who do not.

Regarding the control variables, educational level, business age, and business size positively and significantly influence business growth, while age of the entrepreneur is positive but only weakly significant at the 10% level. These findings suggest that more educated entrepreneurs, older businesses, and relatively larger enterprises have a greater probability of achieving sustained business growth.

The binary logit results indicate that access to microcredit, entrepreneurship training, savings services, business advisory services, and digital financial services are the major microfinance interventions that significantly enhance the growth of women-owned businesses in the selected Niger Delta states, whereas insurance services do not exhibit a statistically significant effect. These findings are consistent with the study's theoretical expectations and support the proposition that comprehensive microfinance services promote entrepreneurial growth among women-owned enterprises.

3.3. Binary Probit Regression Results

To examine the robustness of the Binary Logit estimates, the study estimated a Binary Probit model using the same dependent and explanatory variables. The Probit model assumes that the error term follows a standard normal distribution and serves as an alternative specification to the Logit model. If both models produce similar coefficient signs, significance levels, and conclusions, the findings are considered robust and reliable. The results are presented in Table 4.

Table 4: Binary Probit Regression Estimates of the Effect of Microfinance Services on Business Growth (N = 435)

Variables	Coefficient (β)	Std. Error	z-value	p-value	Marginal Effect (dy/dx)
Constant	-1.472	0.482	-3.05	0.002***	—
Access to Microcredit (AMC)	0.518	0.124	4.18	0.000***	0.167
Entrepreneurship Training (ENT)	0.362	0.111	3.26	0.001***	0.118
Savings Services (SAV)	0.269	0.103	2.61	0.009***	0.086
Business Advisory Services (BAS)	0.228	0.094	2.43	0.015**	0.073
Insurance Services (INS)	0.129	0.082	1.57	0.117	0.041
Digital Financial Services (DFS)	0.417	0.123	3.39	0.001***	0.134
Age (AGE)	0.018	0.009	1.93	0.054*	0.006

Educational Level (EDU)	0.181	0.064	2.83	0.005***	0.058
Business Age (BAGE)	0.113	0.044	2.57	0.010**	0.036
Business Size (BSIZE)	0.212	0.072	2.94	0.003***	0.068

Source: Authors' computation from survey data using Stata 18.

Table 5: Model Summary of the Binary Probit Model

Statistic	Value
Number of Observations	435
Log Likelihood	-192.611
LR Chi-square (10)	140.43
Prob > Chi-square	0.0000
McFadden Pseudo R ²	0.267
Correct Prediction Rate	81.8%
Akaike Information Criterion (AIC)	407.22
Bayesian Information Criterion (BIC)	452.16

Source: Authors' computation from survey data using Stata 18.

The Binary Probit model confirms the robustness of the Binary Logit estimates. The model is statistically significant, with an LR Chi-square value of 140.43 ($p < 0.001$) shown in Table 5, indicating that the explanatory variables jointly explain the probability of business growth among women-owned enterprises. The McFadden Pseudo R² of 0.267 indicates that approximately 26.7% of the variation in business growth is explained by the model, which is very close to the 27.2% reported in the Logit model. Similarly, the model correctly predicts 81.8% of business growth outcomes, further demonstrating good predictive performance.

The Probit estimates reveal that access to microcredit ($\beta = 0.518$, $p < 0.01$), entrepreneurship training ($\beta = 0.362$, $p < 0.01$), savings services ($\beta = 0.269$, $p < 0.01$), business advisory services ($\beta = 0.228$, $p < 0.05$), and digital financial services ($\beta = 0.417$, $p < 0.01$) all have positive and statistically significant effects on the probability of business growth. Their corresponding marginal effects indicate that improvements in these services increase the probability of business growth by 16.7%, 11.8%, 8.6%, 7.3%, and 13.4%, respectively, holding other factors constant.

Consistent with the Logit model, insurance services remain positive but statistically insignificant ($\beta = 0.129$, $p = 0.117$), suggesting that micro-insurance has not yet made a measurable contribution to the growth of women-owned businesses in the selected Niger Delta states. The control variables also exhibit results consistent with the Logit model. Educational level, business age, and business size positively and significantly influence business growth, while age of the entrepreneur is only marginally significant at the 10% level.

Overall, the Binary Probit model produces coefficient signs, levels of statistical significance, and substantive conclusions that closely mirror those obtained from the Binary Logit model. The consistency between the two models confirms that the findings of this study are robust and not sensitive to the choice of binary response specification. This strengthens the validity of the conclusion that access to microcredit, entrepreneurship training, savings services, business advisory services, and digital financial services are the principal microfinance interventions that significantly enhance the growth of women-owned businesses in the selected Niger Delta states.

The findings from both the Binary Logit and Binary Probit models consistently indicate that access to microcredit exerts a positive and statistically significant influence on the growth of women-owned businesses in the selected Niger Delta states. This suggests that women entrepreneurs with improved access to credit are more likely to expand their businesses than those with limited access to finance. This finding

corroborates the studies of AbdulKareem [32], Anam et al. [33], and Nkamnebe and Oladipo [34], who found that microcredit significantly enhances business income, entrepreneurial activities, and women's economic empowerment. However, the result contrasts with the findings of Nwankwo and Otaokpukpu [36], who reported that microfinance loans alone did not significantly improve enterprise growth due to inadequate loan sizes and unfavorable lending conditions.

The study further revealed that entrepreneurship training and business advisory services significantly increase the probability of business growth among women entrepreneurs. The consistency of these results across both the Logit and Probit models underscores the importance of non-financial microfinance services in strengthening entrepreneurial capacity and improving business performance. These findings are in agreement with AbdulKareem [32], Anam et al. [33], and Diaka and Asenge [39], who reported that entrepreneurship training, business advisory services, and financial education substantially improve business management, operational efficiency, profitability, and enterprise sustainability.

The results also demonstrate that savings services and digital financial services positively and significantly influence the growth of women-owned businesses, while insurance services, although positively related to business growth, do not exert a statistically significant effect. The positive effect of savings services supports the findings of AbdulKareem [32], Anam et al. [33], and Diaka and Asenge [39], who observed that savings products enhance capital accumulation, business investment, and entrepreneurial performance. Similarly, the significant contribution of digital financial services highlights the growing importance of technology-enabled financial inclusion in facilitating business transactions and improving enterprise growth. Conversely, the insignificant effect of insurance services suggests that micro-insurance remains underutilized among women entrepreneurs in the study area.

4. Conclusion

This study examined the effect of microfinance services on the growth of women-owned businesses in selected Niger Delta states using the Binary Logit model, with the Binary Probit model employed as a robustness check. The findings from both models consistently revealed that access to microcredit, entrepreneurship training, savings services, business advisory services, and digital financial services significantly increase the likelihood of business growth among women entrepreneurs. In contrast, although insurance services exhibited a positive relationship with business growth, their effect was not statistically significant. The consistency of the Logit and Probit results demonstrates the robustness of the findings and underscores the importance of comprehensive microfinance services in enhancing the growth prospects of women-owned enterprises. The study therefore concludes that improving access to both financial and non-financial microfinance services is essential for promoting sustainable growth of women-owned businesses and strengthening women's contribution to economic development in the Niger Delta region.

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