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A multi-method econometric analysis of SME loan's impacts on women's entrepreneurial development in Bangladesh

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Abstract

The paper examines how the socio-economic developments of women entrepreneurs in Bangladesh are influenced by small and medium enterprises (SMEs). An equal weighted composite index based on a quantitative cross-sectional survey design was employed on 489 women entrepreneurs borrowing SME loans to meet the objectives. The study employed methodologies such as OLS, quantile regression, bootstrapped regression, standardised beta regression, hierarchical regression, and moderation effects to test the hypotheses and check the robustness. Results indicate that access to loans and adequacy of loans have a positive influence on the socio-economic development of women entrepreneurs. On the other hand, tight credit checks, excessive collateral requirements and lack of institutional support are growth inhibitors, particularly among low-income individuals. The study has significant policy implications in that SME loans are significantly contributing to the socio-economic welfare of the women entrepreneurs, and Loan factors impact mostly, while both age and education imply the variations across the benefits received from the SME loans. This paper adds value to the literature by examining the dynamics between financial inclusion and institutional support in determining the success of women entrepreneurs by leveraging rigorous econometric modelling. The study paves the way to further research and policy development with a focus on the absorption of SME benefits by optimising loan factors and institutional factors, similar to other emerging economies.

Introduction

Bangladesh women entrepreneurs are forced to overcome numerous socio-economic challenges, most of which are aggravated by the absence of financial resources and institutional assistance. Despite the growing number of women starting small and medium-sized enterprises (SMEs) in the region, they still have to deal with gendered barriers to conducting business, such as financial illiteracy, the lack of collateral, strict credit conditions, and so forth (Islam et al., 2019). It has been found that accessibility and sufficiency of loans together with the institutional support mechanisms are one of the reasons behind the performance of the entrepreneurship and socio-economic development of these women. The interaction of these elements is crucial to effective interventions that can be directed at empowering women entrepreneurs in Bangladesh, with regard to the overall socio-economic development objectives (Adom & Anambane, 2019).

Even though previous research has explored either financial inclusion or institutional support (Mengstie, 2022; Fitouri & Zouaoui, 2024), very few studies have combined these variables in a unified analytical framework through the application of multi-method econometric analysis.

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The literature in the field also does not consider the influence of demographic moderators (age and education) on the relationship between SME loan characteristics and socio-economic development of women (Franzke et al., 2022; Andriamahery & Qamruzzaman, 2022). This paper fills these gaps by coming up with composite indices, which reflect the multidimensional associations between accessibility, adequacy, institutional support, and empowerment of loan access among Bangladeshi women entrepreneurs.

This study aims to (i) develop and test composite indices of women socio-economic development (SEDI) and financial/institutional drivers; (ii) measure the association between accessibility and adequacy of loans, credit processes, collateral and institutional support and SEDI, after controlling demographics and context; (iii) determine whether these associations differ across development levels and by key moderators (education, age, location); and (iv) translate the evidence into practical recommendations to support lenders and policymakers to improve the outcomes of women entrepreneurs (Khan et al., 2021).

Data were gathered through a quantitative cross-sectional survey design that entailed a cross-sectional study involving 489 women entrepreneurs who have availed themselves of SME loans. A powerful multi-method econometric analysis was applied to the data, which comprises an OLS, quantile regression, and hierarchical modelling. The results show that the availability of flexible and adequate loans is a major boost to the socio-economic growth, particularly for those who are more advanced entrepreneurs. Stringent credit tests and heavy collateral requirements, on the other hand, have adverse effects on growth, especially among the less endowed. Institutional support was seen to be very important to the entrepreneurs in the early stages of business, but not as effective when businesses are mature (Muhammad et al., 2021).

The article emphasises the necessity of particular financial and policy assistance to defeat the peculiar obstacles women have to face at different stages of business development. This study contributes to the existing literature on inclusive development of women entrepreneurship, especially in emerging economies. The study will give a detailed analysis of the interaction of financial inclusion and institutional support and their influence on women entrepreneurs at different stages of business development, unlike the previous studies, which have only focused on either financial inclusion or institutional support (Mengstie, 2022). The results provide useful information to policymakers and financial institutions, implying that women's empowerment needs specific support systems to help it thrive in entrepreneurship and the macroeconomic development of a country. The study paves the way for research and policy development in areas of making SME loans flexible and available to women entrepreneurs, to the extent that inclusive economic contributions have been marginally met in an emerging country like Bangladesh.

Literature Review and Hypotheses Development

Theoretical framework

Three theories have been relied upon in the current study, which are the financial inclusion theory, the institutional theory and the empowerment theory. The theories play a major role in the socio-economic development of Bangladeshi women entrepreneurs.

Financial inclusion theory highlights the fact that the availability of financial resources is highly important in empowering women entrepreneurs. According to Afrin et al. (2024), financial inclusion is mandatory to empower women and promote women in terms of entrepreneurship and leadership. Gender biases, lack of collateral, and financial illiteracy are some of the main barriers women in Bangladesh encounter when trying to scale their businesses due to access to finance (Islam et al., 2017; Amit et al., 2024). These are added by the lack of transparent financial products. According to Urbano et al. (2019) and Bullough et al. (2022), when women are offered easy and transparent loans, this alone can contribute to the success of female entrepreneurs to a great extent.

Institutional theory is concerned with the significance of the institutions (formal and informal) that shape entrepreneurial behaviour (Welter & Smallbone, 2011). Haque et al. (2024) explain that the external institutional support mechanisms that help women entrepreneurs in Bangladesh succeed are training, networking, and business development services. Nevertheless,

Gafur and Islam (2024) claim that such supports do not always reach women entrepreneurs who are more mature, which restricts their efficiency. This lack of support programs is critical because women entrepreneurs in various stages of their business ventures need varied kinds of institutional assistance (Pal et al., 2022; Bannor et al., 2020).

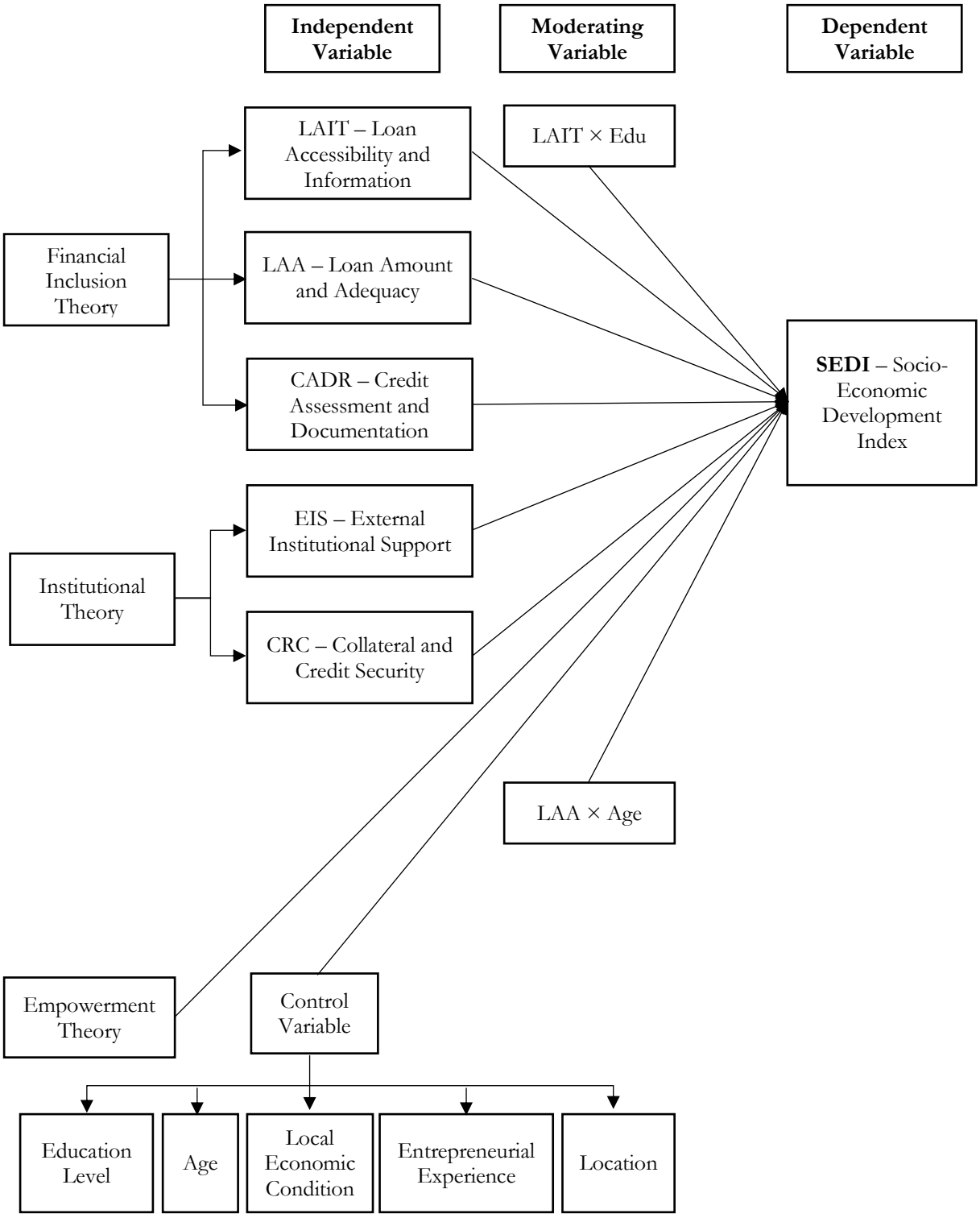

Figure 1. Theoretical Framework
Source: Author's creation

The empowerment theory is focused on the way women can be empowered regarding their ability to control their lives, resources, and choices. Andriamahery and Qamruzzaman (2022) assume that the previous factors of empowering women through entrepreneurship are financial

literacy and technical skills. The empowerment in this case does not mean that access to finance is possible only, but also develops social and human capital (Chowdhury et al., 2018; Polas et al., 2022). According to Moral et al. (2024), empowerment is a complicated process, and it is not only economic capital; it is also social networks, business knowledge and confidence, which are the success keys of women entrepreneurs in Bangladesh.

Empirical discussion

The empirical evidence behind the significance of financial inclusion, institutional support, and women's empowerment in entrepreneurship is abundant and demonstrates the complexity of the development of women entrepreneurs.

Gafur and Islam (2024) provide a systematic evaluation of the conditions influencing Bangladeshi female entrepreneurs, and they supplement it by stating that financial deficiency is an enormous barrier. Women must also contend with the rigidity of collateral demands, gender discrimination, and illiteracy of finance (Islam et al., 2014; Banerjee et al., 2015). Thapa Karki and Xheneti (2018) and Karmakar et al. (2018) also emphasise that the women entrepreneurs are not normally part of the formal financial system; thus, they have very low ability to access loans and credit to grow their business. Women who are entering equity financing, according to Carter et al. (2003) and Urbano et al. (2019), have unlimited access to human, social, and financial capital, which is the secret of the success of the entrepreneur.

According to Amit et al. (2024), in Bangladesh, women can open and grow businesses with the help of financial resources, but their adequacy is not always sufficient. This is the premise of the argument by Carter et al. (2003), who have noted that scaling businesses is based on the adequacy of loan amounts. On the same note, Islam et al. (2017) claim that financial product transparency and accessibility are essential elements of the success of female entrepreneurs. Polas et al. (2022) also note that rural women are disadvantaged by the fact that they do not have access to the banking infrastructure and that they have no entrepreneurial networks, which negatively affects their business development (Autio & Fu, 2015; Adom & Anambane, 2019).

According to Andriamahery and Qamruzzaman (2022), one of the reasons why women can or cannot access and use financial resources effectively is financial literacy. Moral et al. (2024), and Kent and Dacin (2013) echo the same saying that women are not only empowered by financial literacy but also equipped with the knowledge of how to navigate the complex financial system. Thus, empowered women are in a better position to gain access to resources that they require to overcome gendered socio-economic obstacles and succeed in business (Omar et al., 2014; Sohrab et al., 2023).

The importance of agent banking when fostering financial inclusion to rural women entrepreneurs in Bangladesh is emphasized by Sohrab et al. (2023), showing how other types of banking systems increase access to capital and lessen the geographical limitations. On the same note, Gafur and Islam (2024) highlight that institutional support plays a crucial role in women overcoming socio-cultural barriers limiting their entrepreneurial development, but also point out that the institutional support is not fully done yet, especially among the experienced entrepreneurship.

Haque et al. (2024) suggest that the institutional programs should be modified to respond to the level of development of the entrepreneurs because business owners at early stages have more advantages compared to those at the mature stage. In line with this, Bullough et al. (2022), Franzke et al. (2022), Alam et al. (2022), and Vershinina et al. (2022) emphasize that women-led enterprises should receive specific financial and institutional support during such crisis scenarios as COVID-19.

Empirical evidence is always in favour of the idea that financial inclusion, institutional support, and empowerment are critical to the socio-economic development of women entrepreneurship in Bangladesh. Nevertheless, these factors do not produce equal results at various stages of entrepreneurial development, and this requires flexibility and responsiveness of policies and programs to the needs of women entrepreneurs at various stages of business development.

Hypothesis development

Based on the literature reviewed and the theoretical framework, Table 1 provides the hypotheses as proposed:

Table 1. List of Hypotheses with Expected Signs and Variable Types

Ha_i	Hypothesis Statement	Ind. Variable	Dep. Variable	Exp Sign	Reference
H1	Loan accessibility and information transparency (LAIT) positively influences the socio-economic development (SEDI) of women entrepreneurs.	LAIT	SEDI	Positive	(Purwanto et al., 2021); (Rumondor et al., 2023)
H2	Loan amount and adequacy (LAA) positively affect the socio-economic development (SEDI) of women entrepreneurs.	LAA	SEDI	Positive	(Huis et al., 2017); (Taherdoost, 2022)
H3	Credit assessment and documentation requirements (CADR) negatively affect the socio-economic development (SEDI) of women entrepreneurs.	CADR	SEDI	Negative	(Moral et al., 2024); (Yousafzai et al., 2015)
H4	External institutional support (EIS) positively influences the socio-economic development (SEDI) of women entrepreneurs.	EIS	SEDI	Positive	(Omar et al., 2014); (Swedberg, 2020)
H5	Collateral and credit security (CRC) negatively impacts the socio-economic development (SEDI) of women entrepreneurs.	CRC	SEDI	Negative	(Andriamahery & Qamruzzaman, 2022); (Gimenez-Jimenez et al., 2020)
H6	Education level is positively associated with socio-economic development (SEDI) among women entrepreneurs.	Education	SEDI	Positive	(Afrin et al., 2024); (Omar et al., 2014)
H7	Entrepreneurial experience is positively associated with socio-economic development (SEDI).	Experience	SEDI	Positive	(Huis et al., 2017); (Franzke et al., 2022)
H8	Favourable local economic conditions positively influence socio-economic development (SEDI).	Local Economic Condition (Ec)	SEDI	Positive	(Bullough et al., 2022); (Andriamahery & Qamruzzaman, 2022)
H9	Urban women entrepreneurs have higher socio-economic development (SEDI) compared to rural entrepreneurs.	Location (Urban = 1; Rural = 0)	SEDI	Positive	(Alam et al., 2022); (Karmakar et al., 2018)
H10	Age positively influences the socio-economic development of women entrepreneurs.	Age	SEDI	Positive	(Huis et al., 2017)
H11	Loan accessibility and adequacy positively influence the socio-economic development of women entrepreneurs across different stages of development in Bangladesh.	LAIT, LAA	SEDI	Positive	(Omar et al., 2014)
H12	Loan accessibility, loan amount adequacy, and institutional support positively influence the socio-economic development of women entrepreneurs, while credit assessment and collateral requirements negatively affect it.	LAIT, LAA, EIS, CADR, (CRC)	SEDI	Positive for LAIT, LAA, EIS; Negative for CADR, CRC	(Gimenez-Jimenez et al., 2020)
H13	Loan accessibility and adequacy have a positive impact on the socio-economic development of women entrepreneurs, while credit assessment and collateral requirements negatively affect it.	LAIT, LAA, CADR, CRC	SEDI	Positive for LAIT, LAA; Negative for CADR, CRC	(Swedberg, 2020); Omar et al., 2014)

Ha_i	Hypothesis Statement	Ind. Variable	Dep. Variable	Exp Sign	Reference
H14	Loan factors (LAIT, LAA) and institutional factors (CADR, EIS, CRC) incrementally improve the socio-economic development of women entrepreneurs.	LAIT, LAA, CADR, EIS, CRC	SEDI	Positive	(Huis et al., 2017); (Franzke et al., 2022)
H15 (Interaction)	The effect of LAIT on SEDI is stronger for women with lower education levels.	LAIT × Education	SEDI	Positive Moderation	Based on the moderation analysis
H16 (Interaction)	The impact of LAA on SEDI is stronger for older women entrepreneurs.	LAA × Age	SEDI	Positive Moderation	Based on the moderation analysis

Source: Author's creation

Research gap

Financial inclusion and institutional support are the major factors informing the available literature on women entrepreneurship in Bangladesh (Olarewaju & Fernando, 2020; Omar et al., 2014). Nonetheless, the effects of the more infrastructural aspects, including access to technological platforms, a stable supply chain of loans and funds, and effective networks, which are critical to the scalability and sustainability of women-led businesses, are poorly understood. Filling this gap may offer a more comprehensive way of developing women's entrepreneurship.

Research Methods

The study methodology proposed in this study is intended to examine the socio-economic advancement of female entrepreneurs in Bangladesh and how the nature of SME loans and institutional support affect it (Adeniran & Tayo-Ladega, 2024). The study uses a quantitative cross-sectional survey design based on a cross-sectional approach, where the study collects information on 489 respondents who have borrowed SME loans. The methodology is robust because it is a systematic procedure which comprises sample and data collection, indexation, variable description and assumption diagnostics to facilitate statistical analysis (Mohajan, 2018).

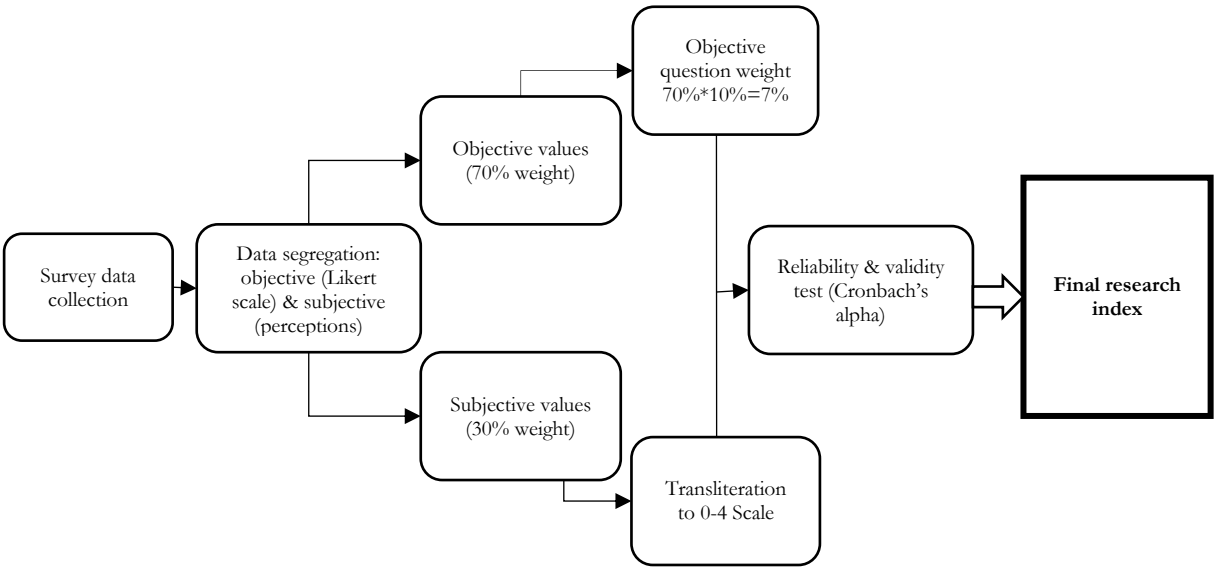

Figure 2. Overview of Research Methodology
Source: Author's creation

Sample and data collection

The research is based on primary data and is collected by use of a structured questionnaire survey of 489 women entrepreneurs in Bangladesh who have taken SME loans. The sample is taken in

different geographical areas, such as urban areas and rural areas, and to cover different socio-economic backgrounds and to represent all the levels of development. Identification of respondents was conducted via collaboration with the local financial institutions and non-governmental organisations, which support women-owned small and medium-sized businesses and the presence of an appropriate population (Purwanto et al., 2021).

Table 2. Respondent Profile (n = 489)

Variable	Category	Frequency	Percentage (%)
Age (years old)	20–29	112	22.9
	30–39	174	35.6
	40–49	137	28.0
	50+	66	13.5
Education level	Primary or below	97	19.8
	Secondary	165	33.7
	Higher secondary	134	27.4
	Graduate or above	93	19.0
Length of business (years)	<3	141	28.8
	3–6	189	38.7
	>6	159	32.5
Business condition (self-assessed)	Stable	187	38.2
	Growing	204	41.7
	Declining	98	20.0

Source: Author's creation

The demographic situation shown in Table 2 validates the heterogeneity of the respondents and serves the purpose of the study to ensure that it captures the differences among various demographic and business traits of women in entrepreneurship in Bangladesh.

The questionnaire is well prepared to provide specific details about the accessibility, sufficiency, and institutional support of loans, and the socio-economic results. To increase the quality and accuracy of data, face-to-face interviews by trained enumerators are applied in order to clarify questions and reduce errors in responses. The sample of 489 is found to be sufficient to conduct a statistically significant analysis. This sample size surpasses William Cochran's ideal sample size of approximately 385, which is a good foundation for the aims of the study (Rumondor et al., 2023).

Table 3. Variable Measurement and Index Construction

Variable Type	Name	Definition	Justification	Reference
Dependent	Socio-economic development index (SEDI)	Composite of income growth	Captures multidimensional development outcomes of women entrepreneurs	(Pal et al., 2022); (Adeniran & Tayo-Ladega, 2024)
Independent	Loan accessibility and information transparency (LAIT)	Measures ease of access and clarity of loan information	Improves financial inclusion and informed borrowing	(Yadav & Unni, 2016); (Vershinina et al., 2022)
Independent	Loan amount and adequacy (LAA)	Measures the sufficiency of the loan amount for business needs	Adequate capital fosters operational growth	(Adeniran & Tayo-Ladega, 2024); (Kent & Dacin, 2013)
Independent	Credit assessment and documentation requirements (CADR)	Reflects the complexity of eligibility and documentation	Bureaucratic hurdles reduce access to credit	(Adom & Anambane, 2019); (Mehta et al., 2022)
Independent	External institutional support (EIS)	Advisory and training services from non-lenders	Supports business continuity and skill-building	(Islam et al., 2019); (Sohrab et al., 2023)

Variable Type	Name	Definition	Justification	Reference
Independent	Collateral and credit security (CRC)	Assesses the severity of collateral requirements	Collateral restrictions disproportionately affect women	(Polas et al., 2022); (Banerjee et al., 2015)
Control	Age	Years (continuous)	Captures life stage influence on business maturity	(Amit et al., 2024); (Tomaszewski et al., 2020)
Control	Education level	Ordinal: none, primary, secondary, higher	Higher education improves business and decision-making	(Vershinina et al., 2022)
Control	Entrepreneurial experience	Years in operation	Experienced entrepreneurs better handle business shocks	(Rashid & Ratten, 2020); (Haque et al., 2024)
Control	Local economic condition (Ec)	Likert score on market conditions	Favourable environments enhance opportunities	(Islam et al., 2019); (Chowdhury et al., 2018)
Control	Location	Urban (1), Rural (0)	Location determines resource and market access	(Alam et al., 2022); (Afrin et al., 2024)

Source: Author's creation

Index generation methodology

Indexation process generates composite indices of dependent variable, socio-economic development index (SEDI) and independent variables such as loan accessibility and information transparency (LAIT), loan amount and adequacy (LAA), credit assessment and documentation requirements (CADR), external institutional support (EIS), and collateral and credit security (CRC) (Swedberg, 2020). SEDI is built by combining factors like growth in income, growth in business, educational levels, access to healthcare, and empowerment as a whole measure of development. The quantifiable and the qualitative data are divided into objective and subjective data to balance the weight of the data (70% weight based on the Likert scale responses and 30% weight based on the perceptions) (Taherdoost, 2022).

Test of reliability and validity

Cronbach's alpha is used to determine reliability and validity, where the scores are above 0.7, as shown in Table 3, where SEDI has a score of 0.86, LAIT 0.81, LAA 0.83, CADR 0.79, EIS 0.82 and CRC 0.80, which represent high internal consistency.

Table 4. Test of Reliability and Validity (Cronbach's Alpha**)**

Names of the Variables	Cronbach's alpha
Socio-economic development index (SEDI)	0.86
Loan accessibility and information transparency (LAIT)	0.81
Loan amount and adequacy (LAA)	0.83
Credit assessment and documentation requirements (CADR)	0.79
External institutional support (EIS)	0.82
Collateral and credit security (CRC)	0.80

Source: Author's creation

Statistical and econometric techniques

To ensure methodological validity, a set of statistical and econometric techniques was used in this study. The analysis was employed in several stages: assumption diagnostics, core model estimation, robustness checks, hierarchical modelling, and interaction analysis.

Assumption diagnostics

The principal statistical assumptions of the multiple linear regression model are tested through assumption diagnostics procedure which include; normality, linearity, homoscedasticity, multicollinearity and influential outliers. This is required to make sure that the method of analysis becomes appropriate and the findings that are going to be achieved are plausible (Rumondor et al., 2023).

The descriptive statistics are used to summarise the data and give the means, standard deviations, minimums and maximums of each of the variables. Such descriptive analysis will measure the dispersion and distribution of the data, and it will provide a foundation to proceed with additional testing and guarantee an in-depth familiarity with the data (Tomaszewski et al., 2020).

The three assumptions of linear regression examined were normality, which had to be tested with the help of histograms with superimposed normal curves, the ShapiroWilk test, and the QQ plots to evaluate the symmetry of the residual (Adeniran & Tayo-Ladega, 2024; Mohajan, 2018). Scatterplot matrices were used to measure the linearity of SEDI with continuous predictors (LAIT, LAA), with minor tolerable deviations in CADR and CRC and categorical variables (age, education) being omitted because of non-linear relationships (Rumondor et al., 2023; Taherdoost, 2022).

The homoscedasticity assumption that implies the constancy of the variance of residuals is verified using the Breusch-Pagan/Cook-Weisberg test. The test is aimed at a chi-square statistic and a p-value that will ensure that the variance of the residuals is not dependent on the predicted values, and a non-significant result showing that the assumption is observed (Tomaszewski et al., 2020).

Multicollinearity is tested using variance inflation factors (VIF), and the aim is to ensure that the value obtained is less than 10 to ensure that the predictor variables are independent. The analysis will target a VIF of less than 10, and a perfect value of less than 5 shows that it does not have any severe issues of multicollinearity that can impact the model (Taherdoost, 2022).

Leverage versus normalised residual squared plot is utilised in the identification of influential observations with the intention of identifying the extreme outliers which might affect the stability of the model. This is achieved by examining the distribution of the data points so as to determine whether there are any high leverage or residual values that would distort the analysis (Adeniran & Tayo-Ladega, 2024).

Base model estimation (the fitted model)

OLS with robust standard errors

The main analysis entailed fitting a multiple linear regression model using robust standard errors to assess the effect of SME loan-related and institutional support factors on SEDI. The model controlled for contextual and demographic characteristics. The full model specification is as follows:

$$SEDI_i = \beta_0 + \beta_1 LAIT_i + \beta_2 LAA_i + \beta_3 CADR_i + \beta_4 EIS_i + \beta_5 CRC_i + \beta_6 Age_i + \beta_7 Edu_i + \beta_8 Exp_i + \beta_9 Ec_i + \beta_{10} Location_i + \varepsilon_i \quad (1)$$

In advance of estimation, diagnostic tests were undertaken to verify that the standard regression assumptions could be made. The histograms and the Shapiro-Wilk test were used to check the normality; the scatterplot matrices were used to examine the linearity; the Breusch-Pagan/Cook-Weisberg test was used to check the homoscedasticity; and the variance inflation factors (VIF) were used to check the multicollinearity (Purwanto et al., 2021).

Quantile regression (QR)

To capture heterogeneous effects across different stages of socio-economic development, quantile regression was applied at the 25th, 50th, and 75th percentiles of the SEDI distribution. The model estimated the conditional quantile functions:

$$Q_\tau(\text{SEDI}_i \mid X_i) = \beta_0(\tau) + \beta_1(\tau)\,\text{LAIT}_i + \beta_2(\tau)\,\text{LAA}_i + \beta_3(\tau)\,\text{CADR}_i + \beta_4(\tau)\,\text{EIS}_i + \beta_5(\tau)\,\text{CRC}_i + \beta_6(\tau)\,\text{Age}_i + \beta_7(\tau)\,\text{Education}_i + \beta_8(\tau)\,\text{Experience}_i + \beta_9(\tau)\,\text{Ec}_i + \beta_{10}(\tau)\,\text{Location}_i + \varepsilon_i(\tau) \quad (2)$$

Where $\tau \in \{0.25, 0.50, 0.75\}$ denotes the 25th, 50th, and 75th percentiles. QR allows for the estimation of variable effects across the conditional distribution of SEDI, capturing heterogeneity between lower-performing and higher-performing entrepreneurs.

Bootstrapped regression

To enhance the accuracy of coefficient estimates and address sampling variability, bootstrapped regression with 1,000 replications was conducted. This technique provided bias-corrected confidence intervals, reducing dependence on normality assumptions. The model retained the MLR structure (Purwanto et al., 2021).

$$\text{SEDI}_i = \tilde{\beta}_0^{(b)} + \tilde{\beta}_1^{(b)}\text{LAIT}_i + \tilde{\beta}_2^{(b)}\text{LAA}_i + \tilde{\beta}_3^{(b)}\text{CADR}_i + \tilde{\beta}_4^{(b)}\text{EIS}_i + \tilde{\beta}_5^{(b)}\text{CRC}_i + \tilde{\beta}_6^{(b)}\text{Age}_i + \tilde{\beta}_7^{(b)}\text{Education}_i + \tilde{\beta}_8^{(b)}\text{Experience}_i + \tilde{\beta}_9^{(b)}\text{Ec}_i + \tilde{\beta}_{10}^{(b)}\text{Location}_i + \varepsilon_i^{(b)} \quad (3)$$

Where $b = 1, \ldots, B$ and $B = 1000$ bootstrap replications. Bootstrapping provides bias-corrected confidence intervals and reduces dependence on normality assumptions, improving the reliability of significance testing.

Standardised beta regression

To assess the relative importance of each predictor, a standardised beta regression was performed by standardising both the dependent and independent variables (Mohajan, 2018).

$$z_{\text{SEDI}_i} = \gamma_0 + \gamma_1 z_{\text{LAIT}_i} + \gamma_2 z_{\text{LAA}_i} + \gamma_3 z_{\text{CADR}_i} + \gamma_4 z_{\text{EIS}_i} + \gamma_5 z_{\text{CRC}_i} + \gamma_6 z_{\text{Age}_i} + \gamma_7 z_{\text{Education}_i} + \gamma_8 z_{\text{Experience}_i} + \gamma_9 z_{\text{Ec}_i} + \gamma_{10} z_{\text{Location}_i} + \nu_i \quad (4)$$

Where $z_X = \frac{X - \bar{X}}{s_X}$ denotes the z-score transformation. Standardised beta regression allows direct comparison of the relative importance of predictors by expressing effects in standard deviation units.

Hierarchical regression

A stepwise hierarchical regression was used to evaluate the incremental explanatory power of different variable groups:

Model 1 (controls only): $\text{SEDI}_i = \alpha_0^{(1)} + \alpha_1^{(1)}\text{Age}_i + \alpha_2^{(1)}\text{Education}_i + \alpha_3^{(1)}\text{Experience}_i + \alpha_4^{(1)}\text{Ec}_i + \alpha_5^{(1)}\text{Location}_i + e_i^{(1)}$ (5)

Model 2 (model 1 + loan factors): $\text{SEDI}_i = \alpha_0^{(2)} + \sum_{j=1}^{5}\alpha_j^{(2)}$ (controls) $+ \alpha_6^{(2)}\text{LAIT}_i + \alpha_7^{(2)}\text{LAA}_i + e_i^{(2)}$ (6)

Model 3 (model 2 + institutional factors): $\text{SEDI}_i = \alpha_0^{(3)} + \sum_{j=1}^{5}\alpha_j^{(3)}$ (controls) $+ \alpha_6^{(3)}\text{LAIT}_i + \alpha_7^{(3)}\text{LAA}_i + \alpha_8^{(3)}\text{CADR}_i + \alpha_9^{(3)}\text{EIS}_i + \alpha_{10}^{(3)}\text{CRC}_i + e_i^{(3)}$ (7)

Hierarchical regression isolates the incremental explanatory power of loan factors and institutional factors beyond controls (Adeniran & Tayo-Ladega, 2024).

Moderation (interaction) effects

To test whether demographic factors influence the strength or direction of key predictors, two interaction terms were introduced:

$$\text{SEDI}_i = \beta_0 + \beta_1\text{LAIT}_i + \beta_2\text{LAA}_i + \beta_3\text{CADR}_i + \beta_4\text{EIS}_i + \beta_5\text{CRC}_i + \beta_6\text{Age}_i + \beta_7\text{Education}_i + \beta_8\text{Experience}_i + \beta_9\text{Ec}_i + \beta_{10}\text{Location}_i + \beta_{11}(\text{LAIT}_i \times \text{Education}_i) + \varepsilon_i \quad (8)$$

$$\text{SEDI}_i = \beta_0 + \beta_1\text{LAIT}_i + \beta_2\text{LAA}_i + \beta_3\text{CADR}_i + \beta_4\text{EIS}_i + \beta_5\text{CRC}_i + \beta_6\text{Age}_i + \beta_7\text{Education}_i + \beta_8\text{Experience}_i + \beta_9\text{Ec}_i + \beta_{10}\text{Location}_i + \beta_{12}(\text{LAA}_i \times \text{Age}_i) + \varepsilon_i \quad (9)$$

Here, β_{11} captures the moderating effect of Education on the relationship between LAIT and SEDI. β_{12} captures the moderating effect of Age on the relationship between LAA and SEDI.

Ethical considerations

The institutional review board (IRB) of the academic institution to which this study belongs granted ethical clearance to this study. The participants were made aware of the objectives of the study and given verbal and written consent. It was voluntary and one could withdraw his/her participation at any moment.

Software and reproducibility

STATA version 17, a widely recognised tool in econometric research, was used for this analysis of the study. Bootstrapping, quantile regression, and interaction modelling were integrated into the analysis. All codes, anonymised datasets and results were stored and could be provided to guarantee an adequate degree of transparency and accuracy.

Results and Discussion

Descriptive statistics

The descriptive statistics for the study's primary variables are discussed in Table 5. The mean scores for SEDI and CADR vary from 2.32 to 1.83 for LAIT. While SEDI and LAA exhibit the most variability, standard deviations demonstrate that other variables have moderate variability. The range of replies, such as the LAA, which varies from 0.09 to 4.00, is represented by the minimum and maximum numbers, which represent varying opinions.

Table 5. Summary Statistics

Variable Name	Mean	Standard Deviation	Min	Max
SEDI	2.32	1.10	0.18	3.97
LAIT	1.83	1.04	0.31	3.91
LAA	2.21	1.11	0.09	4.00
CADR	2.32	1.05	0.01	3.65
EIS	2.17	1.09	0.02	3.99
CRC	2.01	0.92	0.82	3.76

Source: Author's own creation

The results indicate significant variability in women entrepreneurs' experiences with SME loans. Accessing adequate financial resources and support services is challenging, as suggested by the relatively low mean values for loan accessibility (LAIT) and institutional support (EIS). The wide range of minimum and maximum values, especially for loan amounts (LAA), reflects disparities in access to finance across different regions and business sectors.

Normality of residuals

Normality of residuals was investigated through both graphical and statistical techniques. The graphical histogram analysis (Figure 3) indicates a reasonably symmetric distribution that is centred on zero, with minimum kurtosis and skewness, which also supports the assumption of normality.

Normality of residuals was assessed using the Shapiro-Wilk test (Table 6) ($W = 0.979$, $p < 0.001$) and Q-Q plot (Figure 4). Considering the large sample size (n=489), the Central Limit Theorem supports the robustness of linear regression against such mild deviations. The result ($W= 0.979$, $p< 0.001$) indicates significant deviation from perfect normality. Hence, the residuals are considered approximately normal for inferential purposes. Normally Shapiro-Wilk test is effective when the sample size is less than 50. Due to a large sample size of 489, the Shapiro-Wilk test shows deviation from normality. With large samples, the Shapiro–Wilk test becomes overly sensitive to minor deviations; therefore graphical diagnostics and robustness are emphasized.

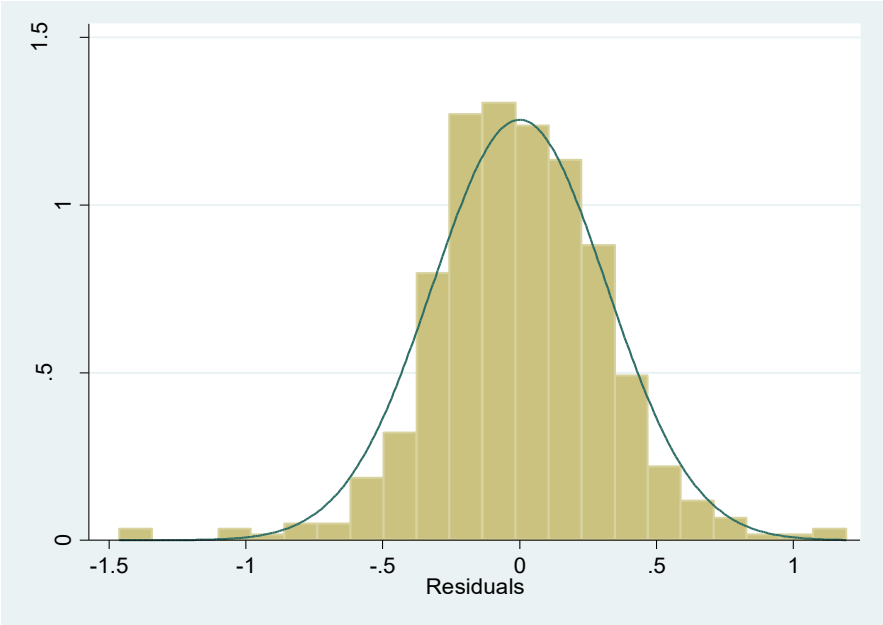

Figure 3. Histogram Analysis
Source: Author's creation

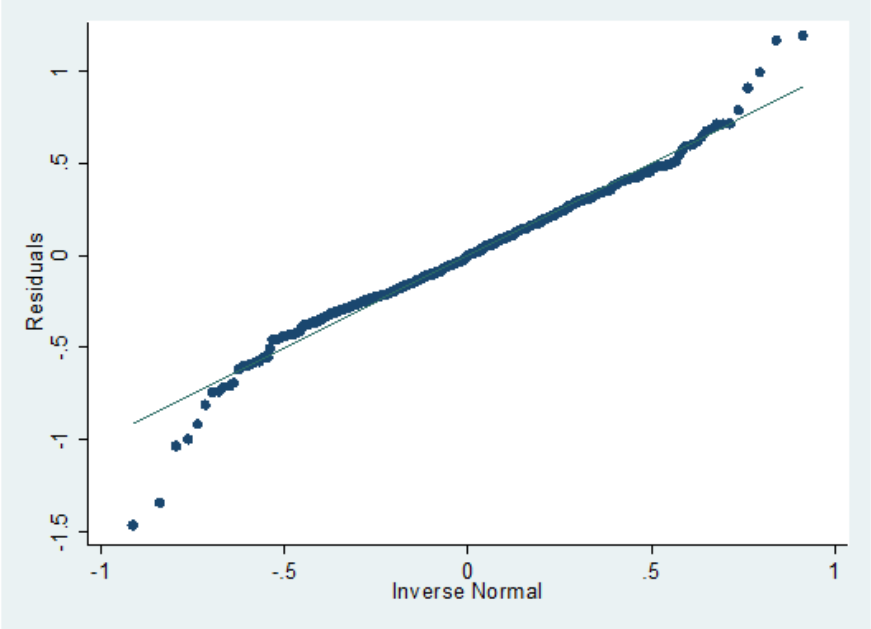

Figure 4. Normality of Residuals
Source: Author's own creation

Table 6. Shapiro-Wilk Test Result for Normality of Residuals

Var	Obs	W	V	z	Prob>z
resid	489	0.979	6.814	4.608	0.000

Source: Author's own calculation

Test of linearity

This scatterplot matrix was generated to evaluate the linearity assumption of multiple linear regression. Figure 5 evaluates the visual relationships among variables. There was a clear linear trend between SEDI and key predictors such as loan accessibility and information transparency (LAIT), loan amount adequacy (LAA), and external institutional support (EIS).

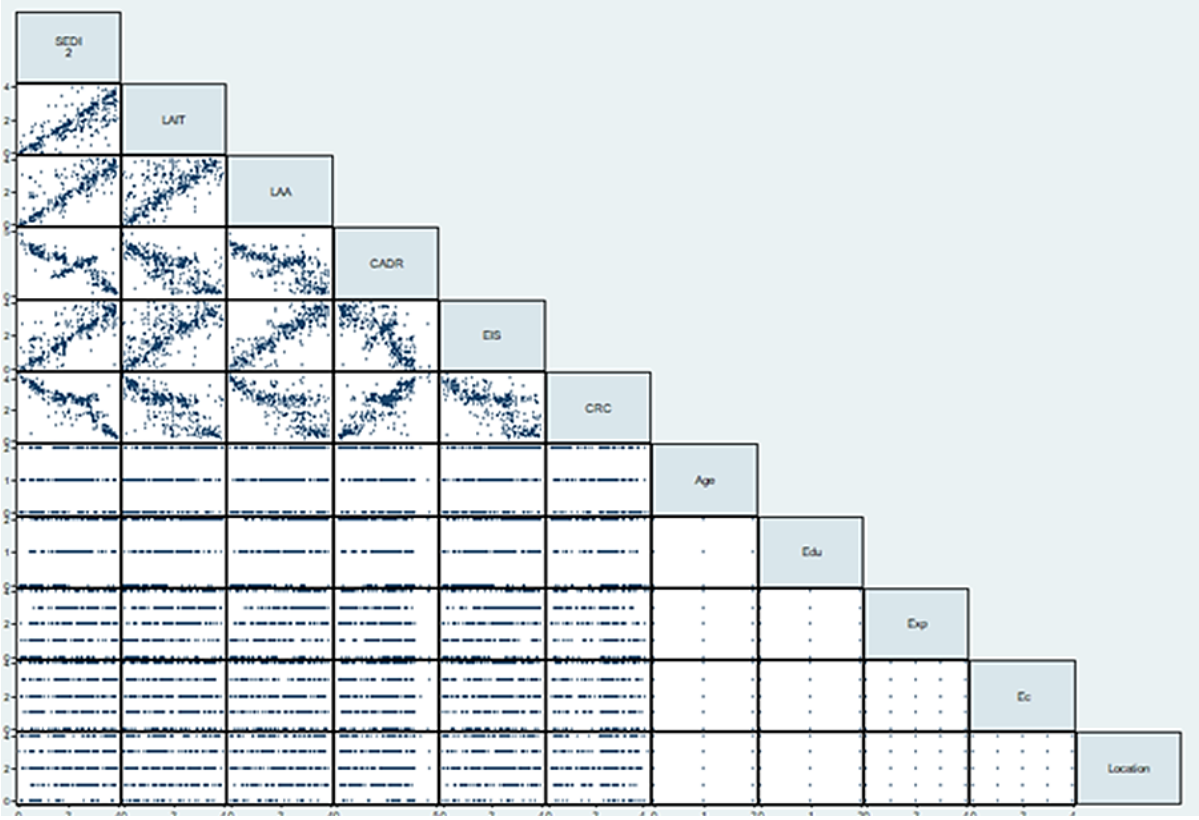

Figure 5. Scatterplot Matrix to Assess Linearity
Source: Author's own calculation

While slight curvature and dispersion were demonstrated in the associations with credit assessment and documentation requirements (CADR) and collateral and credit security (CRC), these deviations were not severe enough to invalidate the linearity of the assumption. As the control variables, age, education, experience, economic condition, and location are ordinal or binary, these are not expected to exhibit continuous linear associations in the assumption of the scatterplot matrix. The assumption of linearity is considered to be satisfied for the key predictors, as given evidence and the robustness of the regression.

Test of homoscedasticity

The Breusch-Pagan/Cook-Weisberg test (Table 7) was conducted using the fitted values of the dependent variable (SEDI) to examine the assumption of homoscedasticity. The test estimates whether the variance of the residuals is constant across observations. A non-significant p-value confirms homoscedasticity and validates the OLS assumption.

Table 7. Breusch-Pagan/Cook-Weisberg Test for Heteroscedasticity

Test	X^2	p-value
Breusch-Pagan/Cook-Weisberg	0.08	0.77

Source: Author's own calculation

Since the p-value is above the 0.05 threshold, the null hypothesis cannot be rejected for constant variance. Therefore, the residuals are homoscedastic, which supports the reliability of regression estimates.

Test of multicollinearity

To assess multicollinearity, variance inflation factors (VIFs) were calculated for all the variables. Table 8 indicates that multicollinearity is not a serious concern as VIF values were below 10.

Table 8. VIF Output Table

Var	VIF	1/VIF
LAA	6.10	0.16
EIS	5.49	0.18
CRC	4.72	0.21
CADR	4.40	0.22
LAIT	2.75	0.36
Edu	2.28	0.43
Age	1.35	0.73
Exp	1.35	0.74
Ec	1.03	0.97
Location	1.02	0.98
Mean VIF: 3.05		

Source: Author's own calculation

The maximum VIF in Table 8 was for loan amount and adequacy. The average VIF across all the variables was 3.05, within acceptable limits. These findings ensure the predictors included in the model are sufficiently independent for reliable estimation.

Residual leverage plot

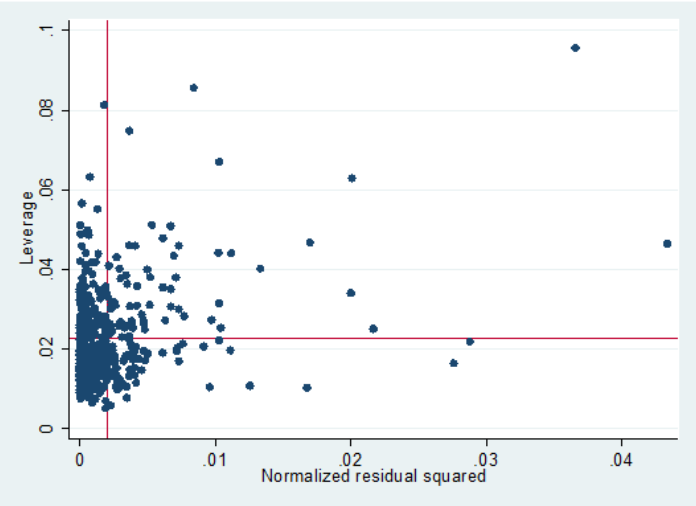

Figure 6. Leverage vs. Normalised Residual Squared Plot
Source: Author's own creation

To ensure the robustness of the regression analysis, a leverage versus normalised residual squared plot in Figure 6 was examined to detect any influential observations. The plot showed that most of the data points had low leverage and low residuals, which indicated that the observations were well spread out in terms of the sample without affecting the model to an unreasonable extent.

Regression estimates

Table 9. Regression Estimates

Variable	(1)	(2)Q25	(2)Q50	(2)Q75	(3)	(4)	(5)	(6)	(7)
Constant	1.79***	1.78***	1.57***	1.56***	1.79***	0.00	0.81***	0.08	1.79***
	(0.16)	(0.15)	(0.15)	(0.15)	(0.16)	(0.01)	(0.10)	(0.07)	(0.12)
LAIT	0.28***	0.31***	0.25***	0.27***	0.28***	0.27***	-	0.47***	0.28***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)		(0.02)	(0.02)
LAA	0.18***	0.14**	0.24***	0.22***	0.18***	0.18***	-	0.44***	0.18***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)		(0.02)	(0.03)
CADR	-0.18***	-0.18***	-0.12***	-0.12***	-0.18***	-0.18***	-	-	-0.18***
	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)			(0.03)

EIS	0.14***	0.15***	-0.18***	-0.20***	0.14***	0.14***	-	-	0.14***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)			(0.03)
CRC	-0.24***	-0.24***	-0.23***	-0.20***	-0.24***	-0.24***	-	-	-0.24***
	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)	(0.03)			(0.03)
Age	0.03	0.01	0.02	-0.00	0.03	0.02	-0.30***	0.08*	0.03
	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.05)	(0.03)	(0.02)
Education/Edu	0.07**	0.04	0.04	-0.04	0.07**	0.05**	-0.78***	0.14***	0.07**
	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	(0.05)	(0.03)	(0.03)
Experience/Exp	0.06**	0.01	0.00	0.03	0.02***	0.02	0.07	0.01	0.02
	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.03)	(0.02)	(0.01)
Economic	0.02*	0.01	0.01	0.02	0.02	0.02	0.01	0.03	0.02
Condition/Ec	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Location	0.08	-0.00	0.01	0.01	0.01	0.01	0.05	0.00	0.01
	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.01)	(0.01)
N	489	489	489	489	489	489	489	489	489
R^2	0.92				0.92	0.92	.54	.86	.92
Adj. R^2	0.92				0.92	0.92	.53	.86	.92

Source: Author's own creation

The fitted OLS model can be expressed as the OLS with robust standard errors as the following equation:

$$\widehat{SEDI} = 1.79 + 0.28LAIT + 0.18LAA - 0.18CADR + 0.14EIS - 0.24CRC + 0.03Age + 0.07Edu + 0.06Exp + 0.02Ec + 0.01Location$$

The results of the tables show concordant trends regardless of the method, which indicates the centrality of financial inclusion in female entrepreneurship empowerment. In the OLS with VCE model (1), the coefficient of loan accessibility and information transparency (LAIT) is highly significant and positive (β= 0.28, p<0.01), and this implies that an increase of one unit in LAIT positively affects SEDI by 0.28 points. This corresponds to the financial inclusion theory, implying that a transparent process of loans reduces the obstacles such as financial illiteracy and gender biases in Bangladesh. Likewise, loan amount and adequacy (LAA) also depicts a positive impact (β=0.18, p < 0.01), meaning that proper financing promotes scaling of business, which is supported by empirical evidence that small loan sizes prevent growth in emerging economies.

Credit assessment and documentation requirements (CADR) and collateral and credit security (CRC) are, on the other hand, very negative (β=-0.18 and -0.24, p < 0.01). In these findings, the major inhibitors have been identified as the bureaucratic obstacles and collateral requirements, disproportionately affecting women because of their ownership of fewer assets and socio-cultural restrictions. The heterogeneity is revealed in a quantile regression (2) showing that the effects are not even at the various development stages. LAIT is positive and strong in the quantiles (β = 0.31 at Q25, 0.25 at Q50, 0.27 at Q75, all p < 0.01), which suggests general benefits but a little higher among low-SEDI entrepreneurs. The impact of LAA increases in the higher quantiles (β = 0.14 at Q25, p < 0.05; 0.24 at Q50 and 0.22 at Q75, p < 0.01) suggesting that sufficient loans are more transformative among the advanced entrepreneurs who already have operations. CADR and CRC are both negative (e.g., CRC: β = -0.24 at Q25, -0.23 at Q50, -0.20 at Q75, all p < 0.01) and hence their inhibitory nature on a global scale. It is important to note that EIS changes to negative at both Q50 and Q75 (β = -0.18 and -0.20, p < 0.01) because institutional support is beneficial to nascent ventures but not mature ventures, which could be attributed to incompatibility in the services offered. The controls are not of much importance except that there are slight changes in education and experience at the upper quantiles.

Bootstrapped estimates (3) are the same as OLS; LAIT (β = 0.28, p = 0.01), LAA (β = 0.18, p = 0.01), CADR (β = -0.18, p = 0.01), EIS (β = 0.14, p = 0.01), and CRC (β= -0.24, p = 0.01) are significant and of the same values, which confirms the protection of bootstrapping estimates against sampling variability Relative importance is emphasised in the standardised beta regression (4): CRC has the most significant negative impact (γ = -0.24), then CADR (γ = -0.18), as the role of procedural barriers is disproportionately influential. The important positive drivers are LAIT (γ = 0.27) and LAA (γ = 0.18), and EIS (γ = 0.14) is moderately significant. Human

capital can be confirmed by education (6) (0.05, $p < 0.05$) and experience (0.02, non-significant in standardised form).

Incremental contributions are shown in the hierarchical regression (5-7). Model 1 (only controls) describes SEDI variance ($R^2 = 0.54$) with education playing a negative dominant role ($\alpha = -0.78$, $p < 0.01$) perhaps because of the early struggles of educated women in resource-deprived settings. The addition of loan factors in Model 2 increases the R^2 to 0.86 with the increase being caused by LAIT ($\alpha = 0.47$, $p < 0.01$) and LAA ($\alpha = 0.44$, $p < 0.01$), which highlights the transformative power of financial accessibility. The entire Model 3 (including institutional factors) attains $R^2 = 0.92$, with the addition of institutional factors (CADR: $\alpha = -0.18$; EIS: $\alpha = 0.14$; CRC: $\alpha = -0.24$, all $p < 0.01$) to the controls and loans that are included in the model. The high explanatory power may partially reflect index construction and common-method variance.

Moderation effects

Table 10. Moderation Effect Estimates

Variable	(8)	(9)
Constant	-0.34 ***	-0.22 **
	(0.11)	(0.10)
LAA	0.19 ***	0.17 **
	(0.05)	(0.05)
CADR	0.20 ***	0.20 **
	(0.05)	(0.05)
EIS	0.15 **	0.15 **
	(0.05)	(0.05)
CRC	0.10 ***	0.09 ***
	(0.02)	(0.02)
Age	0.07 ***	0.02
	(0.02)	(0.04)
Exp	0.01 ***	0.01
	(0.02)	(0.02)
Ec	-0.03	0.03 **
	(0.02)	(0.02)
Location	0.01	0.01
	(0.02)	(0.02)
LAIT	0.48 **	0.42 ***
	(0.05)	(0.04)
Edu	0.22 **	0.15 ***
	(0.06)	(0.04)
LAIT × Edu	0.04	
	(0.03)**	
LAA × Age		0.02 **
		(0.02)
N	489	489
R^2	0.88	0.88

Source: Author's own creation

The moderation analysis explains the influence of demographic variables on the relationship between SME loan factors and socio-economic development index (SEDI) of women entrepreneurs in Bangladesh. The interaction term LAIT × education ($\beta = 0.04$, $p < 0.05$) in Model 8 shows that females with higher educational attainment experience higher returns to the effect loan accessibility and information transparency have on SEDI, which is probably caused by their better ability to negotiate financial markets. The interaction term LAA × Age ($\beta = 0.02$, $p < 0.05$) of Model 9 indicates that older women enjoy more of the socio-economic returns of living with sufficient amounts of loans (LAA), which may be the result of their experience of using the capital effectively. The two models have good explanatory power (R2 = 0.88). These findings confirm

hypothesis H15 and H16 which highlights the necessity of specific financial interventions to enable educated and older women to maximise empowerment and socio-economic development.

Findings

The paper presents the finding of how small and medium enterprise (SME) loans and institutional support affect the socio-economic development index (SEDI) of women entrepreneurs in Bangladesh, with the aims of determining the contribution of loan accessibility, adequacy, and institutional factors on the empowering process of women entrepreneurs, and determining the barriers hindering the success of women entrepreneurs. The research was able to develop equal-weighted composite indices (SEDI, LAIT, LAA, CADR, EIS, CRC) with the set of reliability: Cronbach $\alpha = 0.86$ (SEDI), 0.81 (LAIT), 0.83 (LAA), 0.79 (CADR), 0.82 (EIS), and 0.80 (CRC), which is below the ≥ 0.70 threshold. A clear 70/30 objective-subjective weighting scheme on a sample of 489 respondents was used to develop indices.

The long analyses verify and enlarge the base outcomes, which concur with the goals of the study. To start with, the moderation tests reveal that education moderates the relationship between loan accessibility and information transparency (LAIT) and SEDI to the upside ($\beta = 0.04$, $p < 0.05$), and hence more educated women are better benefited by the clear and transparent loan processes, probably because they have better financial literacy. On the other hand, the age is observed to moderate the loan amount and adequacy (LAA) and SEDI negatively ($\beta = 0.02$, $p < 0.05$), meaning that older women benefit more in terms of socio-economic factors of ample loans, which may be because of their experience of using such capitals. Second, in hierarchical regressions, control variables explain 54 percent of SEDI ($R^2 = 0.54$); add loan factors, it reaches 86 percent ($R^2 = 0.86$); and include institutional factors, it explains 92 percent ($R^2 = 0.92$). Third, bootstrapped regressions with 1,000 replications yield bias-corrected confidence intervals consistent with ordinary least squares estimates, confirming result stability. Fourth, standardized coefficients highlight relative importance: collateral requirements (CRC, $\beta = -0.24$) and credit assessment/documentation burdens (CADR, $\beta = -0.18$) are the strongest inhibitors, while loan accessibility (LAIT, $\beta = 0.27$) and loan adequacy (LAA, $\beta = 0.18$) are the primary positive drivers; institutional support (EIS) has a modest positive effect ($\beta = 0.14$). Finally, quantile regressions reveal distributional heterogeneity: LAIT benefits are consistent across SEDI levels, with slightly larger effects for lower-development entrepreneurs; LAA is more impactful at higher development levels; CADR and CRC consistently hinder development. Although external institutional support (EIS), was predicted to positively impact the socio-economic development, the findings showed a negative impact of the same at the advanced levels of development. This paradox might be a result of the mismatch of the institutional programs and the needs changing among the mature entrepreneurs. The existing support mechanisms are mostly generic and capacity-based, which are useful to the nascent entrepreneurs but do not provide much value to the established entrepreneurs in need of higher technical or financial assistance. This observation indicates that adaptive and stage-specific institutional programs are required and that the risk of inefficiency arises when policy interventions do not get re-calibrated. The results meet the objectives of the study because they measure moderated and distribution specific effects, prove the strength of the results, and reveal the important policy levers.

Statistical analysis of 489 women entrepreneurs shows that loan accessibility and information transparency (LAIT) and loan amount and adequacy (LAA) contribute to SEDI greatly ($p < 0.01$), which proves hypothesis H1, H2, H11, and H13. These findings affirm the hypothesis that the availability and adequate financing promote entrepreneurial development, especially among the advanced-stage entrepreneurs. On the other hand, CREDs and collateral and credit security (CRC) are very detrimental to SEDI ($p < 0.01$), in line with H3, H5, and H13, and the barriers to these are the hardships with bureaucracy that disproportionately impact the limited-resource women. External institutional support (EIS) has a negative but unanticipated effect on SEDI at later developmental levels (H4 not supported) implying that it is only effective with early-stage entrepreneurs. Education and entrepreneurial experience have a positive effect on SEDI (H6, H7 supported), whereas age, location, and local economic conditions are not significant (H8, H9, H10

partially or not supported). Analysis of interaction (H15, H16 supported) suggests that more educated and older women gain more by accessing transparent and adequate loans respectively, which give insight into specific policy interventions.

Table 11. Summary of the Findings

Hypothesis Code	Variable/Interaction	Expected Sign	Observed Sign	Statistically Significant?	Hypothesis Supported?
H1	LAIT	Positive	Positive	Yes ($p < 0.01$)	Supported
H2	LAA	Positive	Positive	Yes ($p < 0.01$)	Supported
H3	CADR	Negative	Negative	Yes ($p < 0.01$)	Supported
H4	EIS	Positive	Negative	Yes ($p < 0.01$)	Not Supported
H5	CRC	Negative	Negative	Yes ($p < 0.01$)	Supported
H6	Education Level	Positive	Positive	Yes ($p < 0.05$)	Supported
H7	Entrepreneurial Experience	Positive	Positive	Yes ($p < 0.01$)	Supported
H8	Local Economic Condition (Ec)	Positive	Positive	No ($p > 0.05$)	Partially Supported
H9	Location (Urban = 1; Rural = 0)	Positive	Negative	No ($p > 0.05$)	Not Supported
H10	Age	Positive	Positive	No ($p > 0.05$)	Not Supported
H11	LAIT, LAA	Positive	Positive	Yes ($p < 0.01$)	Supported
H12	LAIT, LAA, EIS, CADR, CRC	Positive for LAIT, LAA, EIS; Negative for CADR, CRC	Positive for LAIT, LAA; Negative for CADR, EIS, CRC	Yes ($p < 0.01$) for LAIT, LAA, CADR, CRC; Negative for EIS	Partially Supported
H13	LAIT, LAA, CADR, CRC	Positive for LAIT, LAA; Negative for CADR, CRC	Positive for LAIT, LAA; Negative for CADR, CRC	Yes ($p < 0.01$)	Supported
H14	LAIT, LAA, CADR, EIS, CRC	Positive	Positive for LAIT, LAA; Negative for CADR, EIS, CRC	Yes ($p < 0.01$)	Partially Supported
H15 (Interaction)	LAIT × Education	Positive Moderation	Positive	Yes ($p < 0.05$)	Supported
H16 (Interaction)	LAA × Age	Positive Moderation	Positive	Yes ($p < 0.05$)	Supported

Source: Author's own creation

Conclusion and Implications

The study contributes to the financial inclusion theory by confirming that the availability of SME loans (LAIT, LAA) contributes to the socio-economic growth of women (SEDI), and strict criteria (CADR, CRC) increases barriers, making structural inequalities in the emerging economies a core of the theory. It enriches the institutional theory with stage-specific EIS impacts, positive with early entrepreneurs and negative with mature ones, in favor of adaptive frameworks. The moderation findings enhance the empowerment theory which provides more benefits to more educated and older women in loaning, which leads to the promotion of intersectional models. Through the combination of these theories through multi method analysis, the research fills in literature gaps regarding a combined financial-institutional dynamics.

To enhance entrepreneurship by women, policymakers must facilitate the loan processes and minimize the security requirements which is in line with SDGs 5 and 8. Banks will be able to provide stage-specific and transparent loans and provide tiered financial assistance, which will increase repayment and growth. Specific target treatments of low-educated and old women might enhance empowerment, which would contribute to the inclusion in economic growth in

Bangladesh. Causal dynamics could be addressed through longitudinal studies and the generalizability of these studies across South Asia through comparative studies. There is a need to conduct qualitative investigations on the EIS limitations and the role of fintech in reducing barriers.

The present research highlights the critical importance of SME loans in socio-economic empowerment of women in Bangladesh with access and sufficiency promoting empowerment at the expense of bureaucracy. Institutional support is useful in the initial stages but needs adjustment towards maturity. The results inform gender equity policies, which foster sustainable development.

There are limitations of this study. One, it is based on cross-sectional data and this restricts cause and effect. Second, perceptual bias can also occur in self-reports. Third, the research focused on Bangladesh and this renders the study to be not generalizable to other emerging economies with varying institutional background. The future study can use longitudinal data to ascertain causation relationship and comparative analysis across countries in south Asia and mixed-method research in comprehending the qualitative evolution of institutional inefficiencies. Further qualitative research on the limitations of support program structures and operations is also worthy of the negative role of EIS mentioned.

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