

# The Geographical Diversification, Depth of Outreach and Credit Quality Affecting the Financial Sustainability of Formal Microfinance Institutions in Vietnam

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**Abstract:** This study analyzed the impact of geographical diversification, depth of outreach and credit quality on the financial sustainability of microfinance institutions (MFIs) in Vietnam. The study used regression analysis on a set of panel data from 2011 to 2020 of all the formal MFIs in Vietnam. The results showed the geographical diversification, deposit-to-loan ratio, and credit quality had positive relationships with financial sustainability; the depth and worth of outreach, and inflation rate had negative relationships with financial sustainability. Geographical diversification is a way of increasing microfinance outreach by expanding the operation of MFIs in many market segments. At the same time, the geographical diversification helps the MFIs invest in many localities and regions that offer greater growth potential than microfinance services. At the same time, geographical diversification, depth of outreach, credit quality, and financial sustainability are the quality, sustainability and outreach evaluation indicators in microfinance, and it is very important to be monitored by MFIs. Through the findings, the study offers policy implications, recommends and helps the managers and policy-makers of formal MFIs to understand this impact, and they should review their policies to ensure that the operations are directed towards financial sustainability.

**Keywords:** Credit quality, depth of outreach, financial sustainability, geographical diversification, microfinance institutions.

## 1. Introduction to research

Expanding the geographical is one of the operations directions of MFIs to serve more the microfinance customers. As microfinance is rather an important tool for the eradication of poverty, and MFIs tend to reduce poverty and to support the empowerment of socially excluded persons and improve access to financial resources for microfinance customers in many countries. In Vietnam, the operations of formal MFIs have reached 25 provinces and cities with 176 branches and transaction offices. Many formal MFIs had the geographical diversification to develop their operation and improve their financial sustainability to provide more the financial services to low-income poor and very poor self-employed people, these financial services included savings, credit, other basic financial services, and non-financial services. The formal MFIs played an important role in poverty alleviation, the microfinance services could enable the poor people to smooth their consumption, built their asset base, developed the micro enterprises, enhanced the income earning capacity, and improved their quality of life. Nevertheless, many formal MFIs are faced with various challenges like balancing the operating goals, diversified services, profitability, stability, lack of product diversification, low outreach, the capital inadequacy, high transaction cost, demand and supply gap in provision of micro credit and micro saving, human resources challenges, limited management capacity of formal MFIs, etc. At the same time, there are many poor people in localities and regions in country, along with other opportunities, was paving way for the geographical diversification of this sector and offering a huge market potential for the formal MFIs.

There has been a lot of empirical research that attempts to quantify the impact of the indicators in microfinance on the financial sustainability, mostly done at the conventional indicators. This study's purpose was to examine the factors that affect the financial sustainability, it included the geographical diversification, depth of outreach, credit quality, and some other factors. This study has developed an in-depth analysis of microfinance and an econometric analysis on the impact of the factors on the financial sustainability. The research demonstrated that the geographical diversification, depth of outreach, and credit quality had relationship with the financial sustainability. The results presented in this study greatly contribute to the theoretical and experimental knowledge of the factors on the financial sustainability. At the same time, the study offers policy implication, and policy direction, it offers policy-makers a blueprint for reform of the formal MFIs' operations, and improving a more financial sustainability of the formal MFIs. So, they can develop an effective suitable microfinance operation strategy. Therefore, this study is urgently required to balance the goals of formal MFIs. In particular, this study is helpful to decision-makers and other stakeholders of formal MFIs in Vietnam.

## **2. Literature Review**

### ***2.1 Geographical diversification***

Diversification is one of the important subjects of the microfinance sector, and this strategy is also crucial for the MFIs. The MFIs can intend to diversify the operations to increase their financial sustainability. Deng and Elyasiani (2008) found that geographic diversification was measured by the number of locations. According to Hubert (2014), geographical diversification was the number of offices of MFIs, and the MFIs were geographically diversified that were large their operations. Chikalipah (2019) found that the geographic expansion was the extending financial services to the poor, via branch expansion, was optimal for the MFIs. Zamore et al. (2019) examined the geographic diversification relation in microfinance and showed the most common measures of geographic diversification included the number of branches.

### ***2.2 Depth of outreach***

The depth of outreach was defined as access of credit disbursement to the microfinance customers. Ledgerwood (1999) showed the depth of outreach was measured by average loan size. Navajas et al. (2000) showed that depth of outreach was the value that society attached to the gains from the use of microcredit by a given borrower. Deeper outreach increased just social value and not social cost when MFIs found better ways to judge risk at a cost less than the savings from the better judgement. Woller (2004) found the breadth of outreach could be measured by average loan size as a percentage of the gross national income per capita for new loan clients, percentage of female clients, percentage of rural clients, percentage of enterprise loan clients selected with direct poverty targeting tools. According to Quayes (2012), the depth of outreach was defined as access of credit disbursement to borrowers, wherein the borrowers were the greater was the depth of outreach. This study also showed the depth of outreach had received more attention from all quarters who are concerned about the overall social outreach of microfinance including policy-makers. From the point of providing poor people with access to credit, the depth of outreach measured the quality of microcredit. Rao and Fitamo (2014) showed the depth of

outreach was the average loan size, it could be measured dollars disbursed, average balance. Abdulai and Tewari (2017) found the average loan balance per borrower was a measure of depth of outreach, all financial service providers expanded the depth of outreach to develop new products and channels or to move to new regions and market segments. Ha (2020a) concluded the MFIs were striving to develop to ensure coverage for those living with high relative poverty levels (depth of outreach), the depth of outreach was how deep within the clients a microfinance institution was able to reach. There was a diversity in the outreach depth measurement, in this study, the average loan per borrower was used to measure the depth of outreach.

### ***2.3 Credit quality***

According to Microrate (2014), a microfinance institution's largest asset was its loan portfolio. Therefore, the loan portfolio was also its largest source of risk that affected the credit quality of MFIs. For MFIs whose loans were typically not backed by collateral, the quality of the portfolio was absolutely crucial. The most widely used measure of portfolio quality in the microfinance industry was portfolio at risk, which measures the portion of the loan portfolio affected by delinquency as a percentage of the total portfolio. Although various other measures were regularly used, portfolio at risk has emerged as the leading indicator because it was easily understandable, does not understate risk, and was comparable across institutions. Portfolio at risk ratio was calculated by dividing the outstanding balance of all loans with arrears over 30 days, plus all renegotiated (or restructured) loans, by the outstanding gross loan portfolio. Understanding the nature of these loans, and the policies related to restructuring or refinancing loans is important to understand the MFIs' true portfolio quality. This ratio was the most widely accepted measure of portfolio quality. Analysis of portfolio at risk by tenor was a good indicator in competitive markets where the MFIs extended tenor to increase the credit limits of borrowers. Ha (2020b) showed microcredits by nature were used to finance working capital were generally given with short tenors. Portfolio at risk was a useful measure, an analysis of the increase in portfolio at risk in nominal terms could complete an evaluation of portfolio quality. Therefore, portfolio at risk reflected the credit quality of MFIs.

### ***2.4 The factors affecting the financial sustainability***

The financial sustainability refers to the ability of MFIs to cover all of its costs through their income. In this study, financial self-sufficiency was used to measure the financial sustainability. According to Ledgerwood (1999), a microfinance institution would have financial sustainability if the revenue it generates from operations covers its operating expenses, financing costs, loan loss provisions and cost of capital. Ha (2020c) showed that financial sustainability was a tangible parameter that was measured continuously to monitor the level of income to cover all costs to guarantee the long-term development, financial sustainability was associated with all MFIs activities and was influenced by many factors. The financial sustainability received higher attention from all the parties who cared about the total social outreach of microfinance, including the policy makers. The financial sustainability was an outreach length indicator that is influenced by many factors, including:

*Firstly*, depth of outreach: Paxton (2002) found there was the relationship between depth of outreach and financial sustainability, and this study concluded there was a complementary

between financial sustainability and depth of outreach. Quayes (2012) examined the relationship between depth of outreach and financial sustainability of MFIs and showed positive complementary relationship between depth of outreach and financial sustainability of MFIs. Abate (2013) showed there existed a positive complementary between outreach and financial viability for MFIs, and implying a greater depth of outreach together with achieving financial sustainability. Mekonnen and Zewudu (2019) showed there was a complement relation exists between depth of outreach and financial sustainability of MFIs. Therefore, MFIs could achieve the dual objectives, i.e. reaching the target groups and become financially sustainable simultaneously. According to Churchill (2019), there was a trade-off between financial sustainability and depth of outreach of MFIs. Ha (2020d) concluded many MFIs improved the depth of outreach to meet the client needs, contributed to increase their income and improved the financial sustainability. This meant that MFIs focused on attaining the depth of outreach goal was likely to increase the average loan per borrower, generated more income, and improved their financial sustainability.

*Secondly, geographical diversification:* Hubbard (2004) showed that a large branch network ensured customers could access more and more convenient the microfinance services, allowing MFIs to provide the diverse microfinance services, contributing to increasing sustainability. The study of Kotrozo and Choi (2006) continued the discussion regarding the geographical diversification as it related to performance. Specifically, banks which are more geographically focused that have lower annualized stock returns. These results have potential implications for the financial sustainability. This could show that through geographical diversification would adversely affect the financial sustainability. The study of Brighi and Venturelli (2013) concluded the main results suggested that geographical diversification played a role in determining bank performance. These findings had strategic implications both for bank managers, mregulators and supervisors for the consequences on banks' performance and stability. This could show that in increasing the performance and stability had let to improve the financial sustainability. Chikalipah (2019) found that the geographic expansion was the extending financial services to the poor, via branch expansion, was optimal for MFIs. The branching strategy should be accompanied by operational efficiency to safeguard the advantages of economies of scale gained through the scale-up of the branch network. This could show that from the operational efficiency through the scale-up of the branch network would contribute to improve the financial sustainability of MFIs. Sharma and Anand (2019) found that geographical diversification helped in increasing bank returns, and this study indicated these findings could serve as a guiding tool for managers and regulators. This could show that in increasing the returns resulted in increasing the income and contributed to improve the financial sustainability. Ha (2020d) found the MFIs increased the number of branches, expanded operations, attracted many clients, increased their income and contributed to financial sustainability. Ha (2020e) showed that some MFIs had increased the number of branches, expanding the scope of the operations that had contributed to improve their financial sustainability.

*Thirdly, deposit-to-loan ratio:* According to Fiebig et al. (1999), this ratio showed the ability of the mobilization deposits to meet the lending needs of the MFIs. Many customers can be served more by lending from the mobilization deposits. The deposits mobilization had become a strong driving force for improving efficiency and income, contributing to the viability and financial sustainability of MFIs. CGAP (2005) showed the objectives of

mobilizing deposits were twofold: (i) to provide relatively secure deposit services that met the demand of large numbers of poor people on an ongoing basis; and (ii) to improve the sustainability of institutions that provided credit to the poor by developing a relatively stable means to finance their portfolios. Duguma and Han (2018) found the primary motive for mobilizing savings was its lower cost of capital compared to other sources. For rural saving and credit cooperatives, deposit mobilization was the most stable and affordable funding source that ensured their financial sustainability. The results of the panel regression estimates showed that the deposit to loan ratio had a significant direct impact on financial sustainability.

*Fourthly, portfolio at risk:* According to Meyer (2002), the financial un-sustainability in financial institutions arose due to low repayment ratio. Ayayi and Sene (2010) found that a high-quality credit portfolio was instrumental to the financial sustainability of MFIs. The regression results of Tehulu (2013) showed that portfolio at risk had a negative and significant impact on financial sustainability. Thus, portfolio at risk was one of the important determinants of the MFIs' financial sustainability. Mahapatra and Dutta (2016) found the coefficient of portfolio at risk was negative and statistically significant in relationship with financial sustainability. This result might be explained by considering the fact that the more MFIs were exposed to credit risk, the higher was the accumulation of unpaid loans, and lost interest income which reduced financial sustainability of MFIs. Ha (2020f) concluded the MFIs' financial sustainability arose due to high repayment rate which helped them to ensure their operations were safety and effective. This result showed that MFIs had a low portfolio at risk, which helped MFIs to ensure their operations were safety and contributed increasing their financial sustainability. This also showed the portfolio at risk had a negative relationship with financial sustainability of MFIs.

*Fifthly, economic growth rate:* The financial sustainability was one of the most analyzed in the studies that investigate microfinance sector development. The success of MFIs depended on the country-level context, in particular, macroeconomic and macro-institutional features. Understanding these linkages could make MFIs evaluation more accurate and, further, could help to locate microfinance in the broader picture of economic development (Ahlin and Maio, 2011). According to Harelimana (2017), the economic growth rate had a positive effect on the financial self-sufficiency of MFIs. Fernandez et al. (2018) found the results of these studies showed that the macroeconomic conditions of a country, especially the economic growth, could influence the growth of the microfinance operations. Ha (2020d) showed that economic growth had a negative impact on financial sustainability of credit institution. As the economy grows, incomes of people were higher, capital demand, and microfinance services supply also increase. Meanwhile, many credit institutions did not have enough financial and human resources to develop their services.

*Sixthly, inflation rate:* According to Duguma and Han (2018), inflation rate was used to control for the impact of macroeconomic indicators on financial sustainability. There was a relationship between inflation rate and financial sustainability and inflation negatively affected financial sustainability. At the same time, Lensinka et al. (2018) showed macroeconomic variables like inflation are also found to have an effect on the self-sufficiency of the MFIs and inflation reduced financial sustainability of the MFIs because it increased their cost of production. According to Ha (2020d), even though, the co-operative credit

institutions could be able to withstand the effects of inflation at its initial stages, since the co-operative credit institutions system mostly operated with their lending. However, when the rate of inflation became stronger, the co-operative credit institutions system could not absorb the shock. Therefore the inflation rate had an adverse effect on the co-operative credit institutions' profitability and its spillover effect was detrimental to the overall operations; thereby, it was detrimental to financial sustainability of the co-operative credit institutions.

### 3. Research Methodology

The both primary and secondary data were used to achieve the study's purpose. The primary data collected from the MIX Market website, and the annual reports and financial reports of formal MFIs in Vietnam from 2011 to 2020. The secondary data were collected from international journals, books, etc. This study tests the following hypothesis on the impact of geographical diversification, depth of outreach and credit quality on the financial sustainability: (i) There is a positive or negative relationship between the depth of outreach on the financial sustainability, (ii) There is a positive or negative relationship between the geographical diversification on financial sustainability, (iii) There is a negative relationship between the credit quality on the financial sustainability.

**Table 1. Summary of the research model variables**

<b>Variables and symbols</b>	<b>Definition</b>	<b>Expected sign and hypotheses</b>
<b><i>Dependent variable</i></b>		
Length of outreach: Financial self - sustainability (FSS)	Operating income / (Operating expenses + financing costs + provision for loan losses + Cost of capital)	
<b><i>Independent variable</i></b>		
Depth of outreach (ALB)	The average loan per borrower	H1: +/- (high ALB, high or low FSS)
Geographical deversification: Branch (BRA)	The number of baranches	H2: +/- (high BRA, high or low FSS)
Deposit-to-loan ratio (DLR)	Total deposit / Gross loan	H3: + (high DLR, high FSS)
Portfolio at risk (PAR)	Outstanding Balance on Arrears over 30 days + Total Gross Outstanding Refinanced (restructured) Portfolio) / Total Outstanding Gross Portfolio	H4: - (Low PAR, high FSS)
Economic growth rate: Gross domestic product (GDP)	Growth rate of gross domestic product	H5: +/- (high GDP, high or low FSS)
Inflation rate (INF)	Change of the consumer price index annually	H6: - (Low INF, high FSS)

Source: Own study.

The analysis models of the impact of geographical diversification, depth of outreach and credit quality on the financial sustainability of formal MFIs were established as follows.

$$FSS = \beta_0 + \beta_1 ALB + \beta_2 BRA + \beta_3 DLR + \beta_4 PAR + \beta_5 GDP + \beta_6 INF + \mu$$

Where,

The  $\beta_0$  is constant term, the coefficient  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$  and  $\beta_6$  are regression parameters, the  $\mu$  is stochastic error term. The Stata 15.0 software was used in this study, and the definitions of variables and expected signs are presented in Table 1.

This study used regression analysis on a set of panel data, evaluated the fluctuations of variables and performed the correlation analysis. The FEM and REM are the applied models for panel data analysis in this study. The VIF test was carried out on each independent variable of this study model. The research conducted the Hausman test for the model specification for the FEM and REM, and tested for the statistical significance of difference between the coefficients estimates obtained by FEM and by REM, The study chose the result between FEM and REM, and compared them with Pooled OLS to determine the influencing factors for this model and found the impact of geographical diversification, depth of outreach and credit quality on the financial sustainability of formal MFIs. At the same time, the study also conducted testing for a variance change to consider the variance change phenomenon, and checked the autocorrelation to examine serial correlation in this model.

## 4. Research Results

### 4.1 Descriptive statistics and correlation analysis

Descriptive statistics of both dependent and independent variables are presented in Table 2. The results testify that variables FSS, ALB, BRA DLR and INF had smaller standard deviations than the average. Variables PAR and GDP had fluctuations, due to the large difference in portfolio at risk and the economic growth rate between formal MFIs in the period from 2011 - 2020.

**Table 2. Descriptive statistics**

Variable	Mean	Std. Dev.	Min	Max
FSS	108.6402	15.01123	71.74	129
ALB	.01004	.0075793	.0026	.0507
BRA	25.925	22.18383	4	72
DLR	59.035	21.66159	23.76	109.5
PAR	.123575	.1829886	0	.52
GDP	6.312	.6337321	5.25	7.08
INF	5.076	2.960333	.63	9.21

Source: Own calculations

The analysis results of correlation between variables in the model indicate a very low degree of correlation among the variables, the presence of any multicollinearity is neglected in Table 3.

**Table 3. Correlation matrix**

Factors	FSS	ALB	CGR	NAB	PAR	GDP	INF
FSS	1.0000						
ALB	-0.0150	1.0000					
BRA	0.2922	-0.0785	1.0000				
DLR	0.2344	0.6585	-0.2125	1.0000			
PAR	0.3512	-0.1383	0.1098	-0.3846	1.0000		
GDP	0.4840	0.4354	0.0336	0.4066	0.1025	1.0000	
INF	-0.6129	-0.1420	-0.0625	-0.3726	-0.0243	-0.5454	1.0000

Source: Own calculations

#### 4.2 Regression results

The study analyzed the empirical results from estimating the factors on the financial sustainability of formal MFIs. The FSS was taken as dependent variable and ALB, BRS, DLR, PAR, GDP and INF were included as the independent variables. By applying a panel data regression, the study was carried out using FEM and REM, and compared them with OLS. The regression result of FEM and REM found that both P-values were less than the significance level of 5% (P-value = 0.000), and the results were statistically significant at the significance level of 5 %.

**Table 4. Regression results**

Independent variables	Dependent variable (FSS)	
	FEM	REM
ALB	-870.8* (-2.70)	-842.1** (-2.95)
BRA	0.190* (2.59)	0.201** (2.88)
DLR	0.326* (2.16)	0.370** (3.27)
PAR	34.00** (3.29)	35.66*** (3.82)
GDP	0 (.)	5.215 (1.65)
INF	0 (.)	-1.649* (-2.54)
_cons	89.01*** (10.02)	61.08** (2.83)
P-value	0.0000	0.0000

Note: Statistics in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Source: Own calculations

According to the results of the multiple regressions are presented in Table 4 and from the analysis of the FEM showed that variables BRA, DLR and PAR had positive impacts on the variable FSS at the significance level of 10%, 10% and 5%, respectively; the variable ALB had a negative impact on the variable FSS at the significance level of 10%; The variables GDP and

INF had no impacts on the variable FSS in this model. From the analysis of the REM showed that variables BRA, DLR and PAR had positive impacts on the variable FSS at the significance level of 5%, 5% and 1%, respectively; the variables ALB and INF had a negative impacts on the variable FSS at the significance level of 5% and 10%, respectively; variable GDP had positive impact on the variable FSS at the significance, but this last variable was not statistically significant.

The study applied Hausman test to distinguish between the REM and FEM, and choose the suitable model for the study. Hausman test result obtained a P-value of 0.7063, greater than the significance level of 5 % and by running the Hausman test REM was accepted to be the appropriate model. In comparison with the OLS Pooled model, REM was more suitable than the OLS Pooled model. Therefore, REM was used to analyze and test the next steps. The multicollinearity test result showed no serious multicollinearity in this model. Because the model had a result of Mean VIF = 2.38, and VIF of variables from 1.91 to 3.61. Testing for a variance change was considered with the P-value = 1.0000 and was greater than 0.05. This result showed it did not have the variance change phenomenon in this model. The study also checked the autocorrelation of the model, P-value = 0.2826 was greater than 0.05 so this model did not have serial correlation.

## 5. Discussions

The results of REM in Table 4 indicated that variable ALB had a coefficient -842.1 with the significance level of 5%. This result showed that for one unit increased in the depth of outreach, the financial sustainability was anticipated to decrease by 842.1 units, when the remaining variables in the model were kept constant. This finding was broadly in harmony with the findings of Churchill (2019). However, evidence of this study was in contrast with the finding of Paxton (2002), Quayes (2012), Abate (2013), Mekonnen and Zewudu (2019), and Ha (2020d). This result showed there was the trade-off between the depth of outreach and the financial sustainability. This meant that formal MFIs focused on attaining the depth of outreach goal was unlikely to increase the financial sustainability. This could worsen the situation of the financial sustainability situation, the increasing use of commercial funds in formal MFIs resulted in increasing more the depth of outreach, and leading to increase the financing costs and restrict the financial sustainability.

The outcome of the regression analysis indicated the variable BRA had a coefficient 0.201 with a significant level of 5%. This showed that increasing geographical diversification improved the financial sustainability of formal MFIs by 0.201 units per year. As expected, this result was broadly in harmony with the expected signs and hypotheses, and agreed with the study of Hubbard (2004), Brighi and Venturelli (2013), Chikalipah (2019), Sharma and Anand (2019), Ha (2020d), and Ha (2020e), but disagreed with the analysis results of Kotrozo and Choi (2006). There was a complementing relationship exists between the geographical diversification and the financial sustainability of formal MFIs. Accordingly, geographical diversification of the formal MFIs through expansion of the branches could be considered a rational decision. Overall, geographical diversification is advisable in terms of enhancement of operational opportunities. Many formal MFIs increase the number of branches, expand operations, increase income and contribute to their financial sustainability.

The regression result indicated a significant effect of the deposit-to-loan ratio on financial sustainability, with the coefficient being positive and statistically significant at the 5% level. This result showed that for one unit increase in the deposit-to-loan ratio, the financial sustainability was anticipated to increase by 0.370 units, when the remaining variables in the model were kept constant. This meant that the high deposit-to-loan ratio for formal MFIs had higher financial sustainability. This result was broadly in harmony with the expected signs and hypotheses, and agreed with the analysis results of Fiebig et al. (1999), CGAP (2005), Duguma and Han (2018). There was a complemented relationship that exists between the deposit-to-loan ratio and the financial sustainability of formal MFIs. The formal MFIs increased the mobilizing deposits to provide secure deposit services that met the demand of large numbers of poor people, increased the operational income, and contributed to improving their financial sustainability.

The outcome of the regression analysis indicated there was a statistically significant effect of the portfolio at risk on financial sustainability. As unexpected, the study noted a coefficient that was significant at the 1% level. This result showed that for one unit increase in the portfolio at risk, the financial sustainability was anticipated to increase by 35.66 units, when the remaining variables in the model were kept constant. This result disagreed with the analysis results of Meyer (2002), Ayayi and Sene (2010), Tehulu (2013), Mahapatra and Dutta (2016), and Ha (2020c). There was a positive relationship between the portfolio at risk and the financial sustainability of formal MFIs. Most formal MFIs had low portfolios at risk, and the financial sustainability of formal MFIs was raised due to high repayment rates, which helped MFIs to ensure their operations were safe over the years. The decrease in portfolios at risk contributed to improving the financial sustainability of MFIs. In other words, the decrease in the portfolio at risk advanced in the financial sustainability of formal MFIs.

The econometric model result exhibited a very significant effect of the inflation rate on financial sustainability, and the coefficient was negative and statistically significant at the 10% level. This result showed that for one unit reduced in the inflation rate, the financial sustainability was anticipated to increase by 1.649 units, when the remaining variables in the model were kept constant. As expected, this result was broadly in harmony with the expected signs and hypotheses, and agreed with the study of Duguma and Han (2018), Lensinka et al. (2018), and Ha (2020d). There was a negative relationship between the inflation rate and the financial sustainability of formal MFIs. In recent years, the inflation rate in Vietnam has been at an appropriate level, helping the formal MFIs to achieve operational stability, ensure efficient operation and contribute to financial sustainability.

The results of this research were accurate according to the characteristics of formal MFIs from 2011 to 2020. Every year, most of the formal MFIs, step by step, increased the geographical diversification by expanding the branches, increased the mobilizing deposits, strictly controlled the credit quality. On the other hand, this study did not find a statistically significant impact between variable GDP and FSS. This was consistent with the fact that formal MFIs. As the economy grew, the incomes of people were higher, capital demand and microfinance service supply also increased. Meanwhile, the formal MFIs did not have enough financial and human resources to further develop the microfinance services to increase the operational income and promote financial sustainability.

## 6. Conclusions and Recommendations

Financial self-sustainability was used as a proxy for financial sustainability measures. The internal factors used in this study were the depth of outreach, geographical diversification, deposit-to-loan ratio and portfolio at risk of formal MFIs, whereas the external factors were the economic growth rate and inflation. This study's purpose was to analyze the impact of geographical diversification, depth of outreach and credit quality on the financial sustainability of formal MFIs. The study was conducted using a panel data regression method with research data from all formal MFIs in Vietnam from 2011 to 2020. The prominent model was identified and these research results were accurate according to the characteristics of the formal MFIs in Vietnam.

The results found that the three factors that had positive relationships with financial sustainability were the geographical diversification, the deposit-to-loan ratio and credit quality. The two factors that had negative relationships with financial sustainability were the depth of outreach and the inflation rate. The results showed there was a complement relationship that exists between the geographical diversification and the financial sustainability of formal MFIs, there was the trade-off between the depth of outreach and the financial sustainability, there was a positive relationship between the credit quality and the financial sustainability of formal MFIs. At the same time, the results also found there was a complement relationship between the deposit-to-loan ratio and the financial sustainability of formal MFIs, there was a negative relationship between the inflation rate and the financial sustainability of formal MFIs.

Nowadays, the formal MFIs are rapidly changing. Their financial sustainability is an important area. Microfinance services meet the needs and aspirations of the inhabitants, and emphases are towards poverty reduction. Therefore, MFIs contribute to the socioeconomic development of countries. This study will help researchers and managers develop their expertise on the impact of geographical diversification, depth of outreach and credit quality on the financial sustainability of formal MFIs. The study indicated these findings could serve as a guiding tool for managers and regulators. Findings have important implications for financial institutions and policymakers in microfinance market segments. Based on the study results, the article recommends the following to improve financial sustainability.

*Firstly*, the immediate policy recommendation is for formal MFIs to focus more on geographical diversification and the financial sustainability. Thereby, MFIs achieve dual goals including geographical diversification and financial sustainability to strategically move towards for sustainability purposes and pursuing the poverty alleviation goals.

*Secondly*, the managers of formal MFIs and decision makers should focus more on improving geographical diversification, and expansion of the branches could be considered a rational decision as geographical diversification was advisable regarding enhancement of their microfinance outreach opportunities. Nevertheless, to succeed with this strategy, it is necessary to secure the capability to provide stability services. The formal MFIs need to prepare accurate feasibility examinations and systematic management strategies for microfinance services. The formal MFIs should establish diverse local operational networks for not only securing professional skills but planning microfinance service strategies effectively.

*Thirdly*, the managers of formal MFIs should review the policies of outreach depth to ensure that the operations are directed towards financial sustainability. The formal MFIs should also attract financial resources from current and future members, offer other financial services to broaden the activities, improve the financial sustainability situation, reduce the use of commercial funds, resulting in decreasing the financing costs and increasing financial sustainability. These contribute to restricting the trade-off between the depth of outreach and financial sustainability.

*Fourthly*, the managers of formal MFIs and decision makers closely monitor their credit quality and continue credit risk management by adopting risk management practices and proper risk monitoring to ensure the risk management function is established throughout the whole operation, ensure that formal MFIs have low portfolios at risk, and advanced in financial sustainability. These contribute to improving the length of outreach and achieving financial sustainability goals.

*Fifthly*, the managers of formal MFIs should develop management strategy, allocate resources efficiently, fully exploit the internal potential in the conditions of economic growth for greatly increased financial sustainability and contribute to advance the financial sustainability.

*Sixthly*, State bank of Vietnam should ensure a stable monetary policy in the economy and should try to curtail and maintain the long run inflation rate at the low ebb which is one of the channels through which inflation volatility affect the financial sustainability of formal MFIs.

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