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Social Performance and Financial Sustainability Contribute to Implementing Regulations on Operational Objectives of Co-operative Credit Institutions

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Abstract. Co-operative Credit Institutions (CCIs) play an important role for achieving the national mission of financial inclusion. Therefore, we should be taking a wider view of social performance and financial sustainability and assessing social performance and financial sustainability. These are factors affecting the CCIs' operations and goals. This study used the panel data regression method with research data from tweenty-four selected CCIs in Vietnam from 2018 to 2024. This study's purpose to discover the interactive relationship between social performance and financial sustainability in Vietnam's CCIs. The study found that the depth of outreach, deposit-to-loan ratio, financial sustainability have positive relationship with the breadth of outreach, while the age of CCIs has a negative relationship with the breadth of outreach. The age of CCIs, credit size and debt-to-equity ratio have positive relationships with the depth outreach, the financial sustainability has a negative relationship with the depth of outreach. The income and breadth of outreach have positive relationship with financial sustainability; while the depth of outreach, non-performing loan, credit growth negative relationships with the financial sustainability of CCIs. The study results have determined the bidirectional interactions and relationships between social performance and financial sustainability. Through the findings the study offers policy implication and new insights for developing a more sustainable CCIs and further emphasizes optimal policies to CCIs management that helps the policy-makers, CCIs managers and executives in improving the social performance and financial sustainability of CCIs going forward.

1. INTRODUCTION

Co-operative Credit Institution is one of the institutions that provide microfinance services. These institutions have an important role in deepening and widening financial inclusion in the country. Their importance in achieving the national mission of financial inclusion because many CCIs have asserted its role in providing capital to timely and effectively meet the public capital demands, contributing to the local socio-economic development. CCIs could contribute significantly in ensuring access to affordable financial services and increase the outreach by pooling members' savings together for on-lending to the same members. However, many CCIs has faced many challenges, social performance and financial sustainability with many fluctuations, affecting their operations and affecting the ability to expand the scale of the financial service provision over the years, especially in the context of economic uncertainties and banking difficulties in previous years.

Up to now, there has been no research on the relationship between social performance and financial sustainability of CCIs in Vietnam. This study results will contribute to the theoretical and experimental research on the interactive relationship between social performance and financial sustainability. At the same time, the study offers policy implication and new insights for developing a more sustainable CCIs and further emphasizes optimal policies to CCIs management to change the decision-makers' perception of CCIs, so they can develop an effective suitable management strategy. Therefore, the study of the interactive relationship between social performance and financial sustainability is urgently required to improve the social performance and financial sustainability of CCIs. Again, this study is useful for CCIs decision makers and other stakeholders to develop CCIs that are truly the important channel of capital mobilization which has actively contributed to the socio-economic development in Vietnam.

2. LITERATURE REVIEW

The CCIs are the institutions that provide microfinance services, they are controlled by its members, and operated for the purpose of promoting thrift, arranging credit to their members and clients. The CCIs engaged in meeting the capital requirements for diversified activities of the members and clients. At the same time, they play a crucial role in the socio-economic development and contribute to strengthening and expanding formal financial systems, and contributing to the local socio-economic development. To play this role effectively, the CCIs' social performance and financial sustainability have to be strengthened.

2.1. Factors Affecting Social Performance

According to World Bank (2007), social performance was the effective of an institution's social goals into practice in line with accepted social values. The social performance assessment tool included the breadth and depth of outreach. The breadth of outreach includes the number of borrowers, the depth of outreach measures average loan size. According to Abrar (2018), social performance was measured through average loan size and number of credit clients. The breadth of outreach as measured by the

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number of credit clients, the depth outreach as depicted by average loan size.

2.1.1. Factors Affecting the Breadth of Outreach

There are generally assumed that the larger the number of borrowers the better outreach. Quayes (2012) showed that the breadth of outreach was measured by the number of people a microfinance institution has extended credit to, or the number of borrowers over a specific period. Rashid and Twaha (2013) found the number of active borrowers is an indicator of the breadth of outreach,and Abdulai and Tewari (2017) also revealed that the breadth of outreach was related to the actual number of poor people reached with financial services. The breadth of outreach can be thought of as measuring the quantity of micro credit and it was a component associated with the development of CCIs and is influenced by many factors.

Firstly, the age of CCIs: Coleman (2007) found that the older microfinance institutions had acquired knowledge and experience about the market, better operational strategies, customer needs. Through this research, it showed that the age of microfinance institutions contributed to increase the breadth of outreach. Rupa (2017) showed that on the basis of age groups, mature of microfinanace institutions had shown better performance in terms of breadth of outreach.

Secondly, depth of outreach: The study of Cull, Kunt and Morduch (2006) was consistent with an important trade-off between the breadth of outreach and the depth of outreach . Beside, The study of microfinance outreach, Abdulai and Tewari (2017) showed the trade-off relations between the depth and the breadth of outreach of microfinance institutions..

Thirdly, deposit-to-loan ratio: This ratio showed the ability of the mobilization deposits to meet the lending needs of microfinance institutions. Many customers could be served more by lending from the mobilization deposits, and that increased the breadth of outreach of microfinance institutions. The deposits mobilization had become a strong driving force for improving operation of microfinance institutions. (Fiebig, Hannig & Wisniwski, 1999). Deposit account served as a proxy that captures the level of savings amongst microfinance clients and increased in the number of savings account would help microfinance institutions expand outreach, especially the breadth of outreach (Churchill & Marr, 2017).

Fourth, non-performing loan ratio: Okumu (2007) showed that the higher the repayment rate, the better the institution performance. In other words, The lower the non-performing loans ratio, the better the institution performance. Thereby, showed that the low non-performing loans ratio contributed to increase social performance and expand the microfinance institutions' breadth of outreach. The study of Osotimehin, Jegede and Akinlabi (2011) investigated the outreach of microfinance institutions that find that microfinance outreach was positively and significantly determined by loan repayment ratio. Thus, the breadth of outreach was negatively and significantly determined by non-performing loan ratio.

Fifthly, financial sustainability: The microfinance outreach study of Nyamsogoro (2010) showed the trade-off relations between financial sustainability and breadth of outreach. According to Abdulai and Tewari (2017), this meant that institutions that focus on attaining the financial sustainability goal was unlikely to provide microfinance products and services to many poor clients. Further, Mujeri et al., (2017) found that factors such as simultaneous causality relationship between financial sustainability and breadth of outreach, trade-off between financial sustainability and breadth of outreach.

2.1.2. Factors Affecting Depth of Outreach

Ledgerwood (1999) found the depth of outreach was measured by average loan sizeand all financial service providers expanded the depth of outreach to develop new products and channels or to move to new regions and market segments. Quayes (2012) showed that the depth of outreach was defined as access of credit disbursement to borrowers, wherein the borrowers were the greater was higher the depth of outreach. Abdulai and Tewari (2017) concluded that the average loan balance per borrower was a measure of depth of outreach. The depth of outreach measured the quality of micro credit, and it was associated with all CCIs activities and was influenced by many factors.

Firstly, the age of CCIs: Coleman (2007) showed that the age of microfinance institutions told about the experiences acquired by the institution with operations, resource mobilization as well as market experience. Through this research, it also showed that the age of microfinance institutions contributed to increase the depth of outreach. Wijesiri, Yaron and Meoli (2015) found that although older microfinance institutions performed better than younger ones in terms of achieving financial results, they were relatively inefficient in achieving depth of outreach objectives.

Secondly, the size growth of CCIs: Kai (2009) showed that microfinance institution size regarding total assets and microfinance institution size had associated with the loan size per borrower. According to Saad, Taib and Bhuiyan (2018), microfinance institutions with greater asset proportion or with large size also strongly positively influence the outreach of microfinance institutions. This showed that the size growthhad a positive impact on the depth of outreach of microfinance institutions.

Thirdly, credit size: According to Abdulai and Tewari (2017), loan size reflected outreach to poor clients by microfinance institutions, and the study of Saad, Taib and Bhuiyan (2018) pointed out large microfinance institutions tended to focus on large loan size and large size also strongly positively influence the outreach performance of microfinance institutions. Thus, credit size had a positive impact on the depth of outreach of microfinance institutions.

Fourth, debt-to-equity ratio: The study of Osotimehin, Jegede and Akinlabi (2011) found that microfinance outreach was positively and significantly determined by debt-equity ratio. Quayes (2012) showed that debt to equity ratio had a significant positive impact on the depth of outreach. Ha (2019a) also found that debt-to-equity ratio had a positive relationship with the microfinance institutions' depth of outreach.

Fifthly, financial sustainability: Churchill (2019) found that a trade-off between financial sustainability and outreach depth of microfinance institutions. The results also indicate that an increase in financial sustain-ability leads to a much stronger negative effect on outreach depth. On the contrary, Ha (2019a) showed that the financial sustainability had a positive relationships with the depth of outreach of microfinance institutions.

2.2. Factors Affecting Financial Sustainability

Sustainability generally meant the ability of an ongoing program to perform activities and services in pursuit of the planned objectives. For an ideal microfinance institution, this meant the ability to continuously operate. Achieving sustainability was a guarantee for MFIs to be safe in their activities to consolidate their future (Delija & Qirici, 2015). Sustainability could be defined as the ability of the organization to meet the operating cost and build enough reserves for recapitalization (UNESCAP, 2006). A

microfinance institution would have financial sustainability if the revenue it generated from the operation cover Its operating expenses, financing costs, loan loss provisions and cost of capital (Ledgerwood, 1999).

Therefore, the financial sustainability is a tangible parameter that is measured continuously to monitor the level of income to cover all costs to ensure that microfinance institutions will develop in the long-term. The financial sustainability is associated with all microfinance institutions activities and is influenced by many factors.

Firstly, depth of outreach: Paxton (2002) showed that the depth of outreach had relation with the financial sustainability and found strong correlation between outreach and financial sustainability. The study of Quayes (2012) examined the facror impact on the depth of outreach and financial sustainability of microfinance institutions, and this result showed positive complementary relationship between the depth of outreach and financial sustainability.

Secondly, capital adequacy ratio: According to Ledgerwood (1999), capital adequacy meant there was a sufficient level of capital required to absorb potential losses, and provide financial sustainability of microfinance institutions. Ha (2019b) showed that capital adequacy ratio reflects the structure and sufficiency of the capital of CCIs and a high capital adequacy ratiocontributed positively to improve the self-sustainability of CCIs. This also showed that capital adequacy ratio had a positive relationship with financial sustainability.

Thirdly, credit growth rate: MkNelly and Stack (1998) showed there was a significant relationship between sustainability and the growth in loan size. Painter andMkNelly (1999) found that the loan growth was important and has positive impacts on the financial sustainability. Tehulu (2013) also revealed that the financial sustainability of microfinance institutions was positively and significantly driven by lending intensity and size of microfinance institutions.

Fourth, deposit growth rate: According to CGAP (2005), one of the objectives of mobilizing deposits were improving the sustainability of microfinance institutions. Duguma and Han (2018) showed that the deposit mobilization was the most stable and affordable funding source that ensures financial sustainability of microfinance institutions. Ha (2019b) found the CCIs were institutions that provide loans mainly from the mobilized capital, and a high rate of the deposit growth promoted high operational self-sustainability of CCIs. This result also showed the deposit growth rate had a positive relationship with financial sustainability.

Fifthly, income: Yaron (1992) showed that when their income exceeded the costs, microfinance institutions achieved the financial sustainability. Amit and Kedar (2014) found that profit-motivated microfinance institutions had a higher rate of sustainability compared to non-profit microfinance institutions.

Sixthly, breadth of outreach: Kinde (2012) showed the number of borrowers which measures the breadth of outreach improves the financial sustainability of microfinance institutions, and the result indicated positive relationship between the number of borrowers and microfinance institutions' financial sustainability. Khan, Butt and Khan (2017) examined the factors that were affecting the financial self-sufficiency of MFIs and the results show that breadth of outreach had a negative impact on financial self-sufficiency.

Seventh, non-performing loan ratio: Khandker, Khalily and Khan (1995) revealed that loan repayment rate was another indicator for financial sustainability of microfinance institutions. Meyer (2002) showed that the financial sustainability required financial institutions to maintain good financial status, the financial un-sustainability in financial institutions arises due to low repayment rate. Ha (2019b) found that CCIs had a low non-perfoming loan ratio, which helps CCIs to ensure their operations were safety and contributed increasing their operational sustainability. This result also showed the non-perfoming loan ratio had a negative relationship with financial sustainability.

3. RESEARCH METHODOLOGY

The study uses both primary and secondary data and outreach information for CCIs. Primary data were original and unique data collected directly from the first-hand source or study object, and these data were collected from the annual reports and financial reports of tweenty-four selected CCIs in Vietnam from *2018 to 2024*.

Secondary data were gathered from international journals, books, or sites related to study conducted. The analysis model of the interactive relationship between social performance and financial sustainability of CCIs in Vietnam was established as follows:

$$Y_1 = \alpha_{10} + \alpha_{11} Y_3 + \sum_{k=1}^{n} \beta_{1k} X_{1k} + \mu_1 \quad (1)$$

$$Y_2 = \alpha_{20} + \alpha_{21} Y_3 + \sum_{\gamma=1}^{m} \beta_{2\gamma} X_{2\gamma} + \mu_2 \quad (2)$$

$$Y_3 = \alpha_{30} + \alpha_{31} Y_1 + \alpha_{32} Y_2 + \sum_{\delta=1}^{q} \beta_{3\delta} X_{3\delta} + \mu_3 \quad (3)$$

Where,

Y_1 is the variable that measures outreach breadth, determined the number of active borrowers. Y_2 is the variable that measures outreach depth, determined by the average loan per borrower. Y_3 is the financial sustainability variable that measures financial self- sustainability, determined by the ratio of operating income to total operating expenses, financing costs, provision for loan losses and cost of capital. X_{1k}, $X_{2\gamma}$ and $X_{3\delta}$ are the independent variables that can affect social performance and financial sustainability in equations (1), (2) and (3), respectively.

The coefficient α and coefficient β are the correlation coefficients of the independent variables with the dependent variables, which are the error terms of the model. For simplicity, *i*ndicator *i* represents the number of observations and indicator *t* represents the number observed year. This study uses Stata 15.0 software with the variables described briefly, the definitions of variables and expected signs are presented in Table 1.

Table 1: Summary of the research model variables.

Variables and symbols	Definition	Expected sign and hypotheses
Factors affecting social performance		
Dependent variable		
Breadth of outreach (NAB)	The number of active borrowers	
Independent variables		
The age of CCIs (AGE)	The number of CCIs operation years	H1.1: + (high AGE, high NAB)
Depth of outreach (ALB)	The average loan per borrower	H1.2: - (high ALB, low NAB)
Deposit-to-loan ratio (DLR)	Total deposit / Gross loan	H1.3: + (high DLR, high NAB)
Non-performing loan ratio (NPL)	Non-performing loans / Total loans	H1.4: - (high NPL, low NAB)
Financial self - sustainability (FSS)	Operating income / (Operating expenses + financing costs + provision for loan losses + cost of capital)	H1.5: - (high FSS, low NAB)
Dependent variable		
Depth of outreach (ALB)	The average loan per borrower	
Independent variables		
The age of CCIs (AGE)	The number of CCIs operation years	H2.1: +/- (high AGE, high or low ALB)
The size growth of CCIs: Assets growth rate (AGR)	Growth in assets	H2.2: + (high AGR, high ALB)
Credit size (CS)	Gross loan	H2.3: + (high CS, high ALB)
Debt-to-equity ratio (DER)	Total liabilities / Total equity	H2.4: + (high DER, high ALB)
Financiall self- sustainability (FSS)	Operating income / (Operating expenses + financing costs + provision for loan losses + cost of capital)	H2.5: +/- (high FSS, high or low ALB)
Factors affecting financial sustainability		
Dependent variable		
Financial self - sustainability (FSS)	Operating income / (Operating expenses + financing costs + provision for loan losses + cost of capital)	
Independent variable		
Depth of outreach (ALB)	The average loan per borrower	H3.1: + (high ALB, high FSS)
Capital Adequacy Ratio (CAR)	Total Capital / Risk-Weighted Assets	H3.2: + (high CAR, high FSS)
Credit growth rate (CGR)	Growth in loan outstanding	H3.3: + (high CGR, high FSS)
Deposit growth rate (DGR)	Growth rate of customer deposits	H3.4: + (high DGR, high FSS)
Income (INC)	Operating income	H3.5: + (high INC, high FSS)
Breadth of outreach (NAB)	The number of active borrowers	H3.6: - (High NAB, low FSS)
Non-performing loan ratio (NPL)	Non-performing loans / Total loans	H3.7: - (High NPL, low FSS)

This study used regression analysis on a set of panel data, evaluated the fluctuations of variables and performed the correlation analysis. The study performed the fixed effects estimation according to the fixed effects model (FEM) and performed the random effects estimation according to the random effects model (REM). This research performed the Hausman test 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 the pooled ordinary least square model (OLS) to determine the influencing factors for each model and found the factors affecting social performance and financial sustainability, and the interactive relationship between social performance and financial sustainability of CCIs in Vietnam.

4. RESEARCH RESULTS

4.1. Descriptive Statistics and Correlation Analysis

The results of descriptive statistics of both dependent and independent variables showed that the AGE, ALB, CAR, DER, DLR, FSS, NAB, NPL variables had smaller standard deviations than the average. The CCIs operated for many years with a period of from sixteen to twenty-six five. The capital adequacy ratio was more than 8%. Some CCIs had high NPL ratios and suffered losses in their operations, which affected to their financial sustainability. The AGR, CGR, CS, DGR, INC variables have fluctuations, due to the large difference in the asset growth rate, credit growth rate, credit size, deposit growth rate and income between formal CCIs in Vietnam in the period from 2018 to 2024. In particular, the asset growth rate, credit growth rate, credit size, deposit growth rate were reduced, and the revenue operations could not cover their cost operations in some CCIs as can be seen in Table 2.

Table 2: Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
AGE	168	21.25	2.012201	16	25
AGR	168	6.893333	16.39073	-37.71	85.85
ALB	168	79.26924	38.39884	22.09	293.88
CAR	168	18.04	6.779657	8.02	41.15
CGR	168	0.0669514	0.1466846	-0.214	1.087
CS	168	117503.6	128319.2	13393	505037
DER	168	11.32847	4.022083	3.35	22.14
DGR	168	0.0687174	0.1798071	-0.37	1.022
DLR	168	0.9884028	0.1595959	0.51	1.45
FSS	168	110.6	8.160111	68.4606	137.667
INC	168	204.5032	239.9829	-90.17	1054.21
NAB	168	1375.194	1171.155	241	6215
NPL	168	1.201736	1.189866	0	6.34

This study performed the correlation analysis between variables in the model and showed a very low degree of correlation among the variables so the presence of any multicollinearity was neglected as can be seen in Table 3.

Table 3: Correlation matrix.

Correlation matrix for factors affecting breadth of outreach								
Factors	NAB	AGE	ALB	DLR	FSS	NPL		
NAB	1.0000							
AGE	-0.1293	1.0000						
ALB	0.1902	0.2298	1.0000					
DLR	0.3269	-0.0950	0.2005	1.0000				
FSS	0.1199	-0.1347	-0.2407	-0.0503	1.0000			
NPL	-0.0228	0.1084	0.0882	0.0414	-0.4160	1.0000		
Correlation matrix for factors affecting depth of outreach								
Factors	ALB	AGE	AGR	CS	DER	FSS		
ALB	1.0000							
AGE	0.2298	1.0000						
AGR	-0.0730	-0.2774	1.0000					
CS	0.5334	-0.0478	-0.1196	1.0000				
DER	0.2612	-0.0738	0.2088	0.2678	1.0000			
FSS	-0.2407	-0.1347	-0.1266	-0.0081	-0.2620	1.0000		
Correlation matrix for factors affecting Financial sustainability								
Factors	FSS	ALB	CAR	CGR	DGR	INC	NAB	NPL
FSS	1.0000							
ALB	-0.2407	1.0000						
CAR	0.2274	-0.2508	1.0000					
CGR	-0.2266	-0.0534	-0.1833	1.0000				
DGR	-0.0158	-0.0907	-0.0822	0.5501	1.0000			
INC	0.2835	0.3830	-0.1182	-0.1636	-0.0619	1.0000		
NAB	0.1199	0.1902	-0.1474	-0.1212	-0.0542	0.8424	1000	
NPL	-0.4160	0.0882	0.0204	0.0506	0.0467	-0.1268	-0.0228	1000

4.2. Regression Results

4.2.1. Regression Results for Factors Affecting the Breadth of Outreach

The NAB was taken as dependent variable and AGE, ALB, DLR, FSS, NPL were included as explanatory variables in this study. Regression was carried out using FEM and REM, and compared them with OLS. The result of the FEM and REM showed that both P-values were less than the significance level of 5% (P-value = 0.000), and the regression results were statistically significant at the significance level of 5 %. In FEM, the variables ALB, DLR and FSS had positive impacts on the variable NAB at the significance level of 10%, 5% and 10%, respectively; the variable NPL had a positive impact on the variable NAB, the variable AGE had a negative impact on the variable NAB, but these variables were not statistically significant. In REM, the variables ALB, DLR and FSS had positive impacts on the variable NAB at the significance level of 10%, 1% and 10%, respectively; the variable NPL had a positive impact on the variable NAB, the variable AGE had a negative impact on the variable NAB, but these variables were not statistically significant.

The study ran the Hausman test and tested for the statistical significance of difference between the coefficients estimates obtained by FEM and by REM. Hausman test result obtained a P-value of 0.9474, 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. Hence, 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 = 1.20, and VIF of variables from 1.11 to 1.32. 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 = 0.0124 was smaller than 0.05 so this model had serial correlation.

After overcoming the serial correlation with the cluster command (REM-cluster), the results showed that variables ALB, DLR and FSS had positive impacts on the variable NAB at the significance level of 10%, 1% and 5%, respectively; variable AGE had a negative impact on the variable NAB at the significance level of 10%, variable NPL had a positive impact on the variable NAB, but this variable was not statistically significant as can be seen in Table 4.

Table 4: Regression results for factors affecting breadth of outreach.

Independent variables	Dependent variable (NAB)		
	FEM	REM	REM-cluster
AGE	-118.5	-75.05	-75.05*
	(-1.26)	(-1.59)	(-2.41)
ALB	6.170*	6.212*	6.212*
	(2.27)	(2.43)	(2.08)
DLR	2164.2**	2065.0***	2065.0***
	(3.32)	(3.51)	(15.02)
FSS	31.39*	25.98*	25.98**
	(2.28)	(2.06)	(2.94)
NPL	67.56	36.28	36.28
	(0.74)	(0.43)	(0.39)
_cons	-2288.0	-2480.5	-2480.5**
	(-1.00)	(-1.28)	(-2.68)
P-value	0.0003	0.0000	0.0000
N	168	168	168

Note: t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001

4.2.2. Regression Results for Factors Affecting the Depth of Outreach

The ALB was taken as dependent variable and AGE, AGR, CS, DER, FSS were included as explanatory variables in this study. Regression was carried out using FEM and REM, and compared them with OLS. The result of the FEM and REM showed that both P-values were less than the significance level of 5% (P-value = 0.000), and the regression results were statistically significant at the significance level of 5 %. In FEM, the variables CS and DER had positive impacts on the variable ALB at the significance level of 1% and 10%, respectively; variable AGR had a positive impact on the variable ALB, the variables AGE and FSS had negative impacts on the variable ALB, but these variables were not statistically significant. In REM, the variables CS and DER had positive impacts on the variable ALB at the significance level of 1% and 10%, respectively; the variable AGR had a positive impact on the variable ALB, the variables AGE and FSS had negative impacts on the variable ALB, but these variables were not statistically significant.

The study ran the Hausman test and tested for the statistical significance of difference between the coefficients estimates obtained by FEM and by REM. Hausman test result obtained a P-value of 0.0535, 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. Hence, 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 = 1.35, and VIF of variables from 1.17 to 1.66. 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 = 0.0401 was smaller than 0.05 so this model had serial correlation.

After overcoming the serial correlation with the cluster command (REM-cluster), the results showed that variables AGE, CS and DER had positive impacts on the variable ALB at the significance level of 1%, 1% and 5%, respectively; the variable FSS had a negative impact on the variable ALB at the significance level of 1%, the variable AGR had a positive impact on the variable ALB, but this variable was not statistically significant as can be seen in Table 5.

Table 5: Regression results for factors affecting depth of outreach.

Independent variables	Dependent variable (ALB)		
	FEM	REM	REM-cluster
AGE	-0.932	-0.932	4.607***
	(-0.38)	(-0.38)	(4.01)
AGR	0.155	0.155	0.0353
	(0.90)	(0.90)	(0.30)
CS	0.000147***	0.000147***	0.000156***
	(7.01)	(7.01)	(6.09)
DER	1.517*	1.517*	0.854**
	(2.06)	(2.06)	(3.04)
FSS	-0.599	-0.599	-0.840***
	(-1.72)	(-1.72)	(-3.35)
_cons	129.8*	129.8*	46.06
	(2.15)	(2.15)	(1.10)
P-value	0.0000	0.0000	0.0000
N	168	168	168

Note: t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001.

4.2.3. Regression Results for Factors Affecting Financial Sustainability

The FSS was taken as dependent variable and ALB, CAR, CGR, DGR, INC, NAB, NPL were included as explanatory variables in this study. Regression was carried out using FEM and REM, and compared them with OLS. The result of the FEM and REM showed that both P-values were less than the significance level of 5% (P-value = 0.000), and the regression results were statistically significant at the significance level of 5 %. In FEM, the variables CAR and INC had positive impacts on the variable FSS at the significance level of 1% and 10%, respectively; the variables ALB, CGR, NAB and NPL had negative impacts on the variable FSS at the significance level of 1%, 10, 1% and 1%, respectively; the variable DGR had a positive impact on the variable FSS, but this variable was not statistically significant. In REM, the variable INC had a positive impact on the variable FSS at the significance level of 1%, the variables ALB, CGR, NAB and NPL had negative impacts on the variable FSS at the significance level of 1%, 10, 1% and 1%, respectively; the variables CAR and DGR had positive impacts on the variable FSS, but these variables were not statistically significant.

The study ran the Hausman test and tested for the statistical significance of difference between the coefficients estimates

obtained by FEM and by REM. Hausman test result obtained a P-value of 0.1758, 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. Hence, 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 = 2.41, and VIF of variables from 1.25 to 4.41. 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 = 0.0579 was greater than 0.05 so this model did not have serial correlation as can be seen in Table 6.

Table 6: Regression results for factors affecting financialsustainability.

Independent variables	**Dependent variable (FSS)**	
	FEM	**REM**
ALB	-0.0752***	-0.0839***
	(-4.29)	(-5.20)
CAR	0.183*	0.157
	(2.25)	(1.92)
CGR	-10.38*	-10.80*
	(-2.45)	(-2.48)
DGR	4.460	4.650
	(1.15)	(1.34)
INC	0.0248***	0.0267***
	(5.26)	(5.75)
NAB	-0.00300***	0.00329***
	(-3.44)	(-3.73)
NPL	-2.083***	-1.989***
	(-4.63)	(-4.37)
_cons	115.2***	116.3***
P-value	0.0000	0.0000
N	168	168

Note: t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001.

5. DISCUSSIONS

5.1. Discussions of Factors Affecting Social Performance

The results of REM-cluster in table 4 showed that variable AGE had a coefficient -75.05 with the significance level of 10%. This showed that the variable AGE had a negative effect on the variable NAB. This result disagreed with the expected sign and hypotheses, and disagrees with the analysis results of Coleman (2007) and Rupa (2017). The age of CCIs reflected operational experience, but it was negatively and statistically significantly related to the breadth of outreach, which implied that for any additional year of existence of the CCIs, the breadth of outreach decreased over the years. Through this result showed that the experience did not yet play the important role in dealing with the clients as it did not yet provide chance for lenders and borrowers to understand each other and served each other more efficiently. Many CCIs had the higher the age, the smaller the breadth of outreach over the years.

The variable ALB had a positive impact on the variable NAB with coefficient 6.212 with the significance level of 10%. This showed that increasing the depth of outreach improved the breadth of outreach of CCIs by 6.212 units per year. This result disagreed with the expected sign and hypotheses, and disagreed with the analysis results of Cull, Kunt and Morduch (2006), Abdulai and Tewari (2017). This meant that in the attainment of the social goal, CCIs made deliberate programs as to which segment of the clients to target and the average loan per borrower. Thereby, CCIs were established that the interactive relationship between the depth and breadth of outreach in a positive trend over the years.

The variable DLR had a positive impact on the variable NAB with coefficient 2065.0 with the significance level of 1%, and indicating that DLR had powerful effects on the breadth of outreach. This result agreed with the expected sign and hypotheses, and agreed with the analysis results of Fiebig, Hannig and Wisniwski (1999), Churchill and Marr (2017). Many CCIs had the ability of the mobilization deposits to meet the lending needs, and many borrowers could be served more by lending from the mobilization deposits, and that contribute to increase the breadth of outreach over the years.

The variable FSS had a positive impact on the variable NAB with coefficient 25.98 with the significance level of 5%. This showed that increasing the financial sustainability improved the breadth of outreach of CCIs by 25.98 units per year. This result disagreed with the expected sign and hypotheses, and disagreed with the analysis results of Nyamsogoro (2010), Abdulai and Tewari (2017), Mujeri et al. (2017). This meant that CCIs focused on attaining the financial sustainability goal was likely to provide microfinance products and service to many the clients. The CCIs achieve dual goals because of industry evolution that had caused the CCIs to strategically move towards for sustainability purposes and pursuing the poverty alleviation goals. This became better the access to financial services of the clients, and their members.

The results of REM-cluster in Table 5 showed that variable AGE had a coefficient 4.607 with the significance level of 1%, indicating that AGE had a very strong impact on the depth of outreach. This result agreed with the analysis result of Coleman (2007), but disagreed with the analysis results of Wijesiri, Yaron and Meoli (2015). The results suggested that the older CCIs had higher the depth of outreach than young ones, and implied that for any additional year of existence of the CCIs, the depth of outreach increased over the years. The experience was important in dealing with the clients as it provided chance for CCIs and borrowers to understand each other and served each other more efficiently.

The variable CS had a coefficient 0.000156 with the significance level of 1%, indicating that CS had a very strong impact on the depth of outreach. This result agreed with the expected sign and hypotheses, and agreed with the analysis results of Abdulai and Tewari (2017), Saad, Taib and Bhuiyan (2018). This showed that CCIs focused on attaining the credit size goal were likely to contribute for increasing the depth of outreach, and this meant that in the attainment of the social goal, the CCIs made deliberate choices as to which increasing the credit size. Beside, the large CCIs had advantages in scale and tended to focus on large loan size, which also positively affected the depth of outreach of CCIs over the years.

The variable DER had a coefficient 0.854 with the significance level of 5%. This showed that increasing the debt-to-equity ratio improved the depth of outreach of CCIs by 8.54%. This result agreed with the expected sign and hypotheses, and

agreed with the analysis results of Osotimehin, Jegede and Akinlabi (2011), Quayes (2012). This implied that the increasing use of commercial funds in CCIs resulted in increasing more the depth of outreach. Many CCIs used funding sources for lending, and this CCIs increased the average loan per borrower from liabilities over the years.

The variable FSS had a coefficient -0.840 with the significance level of 1%. This showed that increasing the financial sustainability reduced the depth of outreach of CCIs by 8.40%. This result agreed with the analysis result of Churchill (2019), but agreed with the analysis result of Ha (2019a). This result showed there was the trade-off between the financial sustainability and the depth of outreach. This meant that CCIs focused on attaining the financial sustainability goal was unlikely to increase the average loan per borrower. This could worsen the situation of the average loan per borrower, and CCIs could not provide enough the borrowers' needs, and leading to their exclusion from finance markets.

5.2. Discussions of Factors Affecting Financial Sustainability

The results of REM in Table 6 showed that variable ALB had a coefficient -0.0839 with the significance level of 1%. This showed that increasing the depth of outreach improved the financial sustainability of CCIs by 8.39%. This result disagreed with the expected sign and hypotheses, and disagreed with the analysis results of Paxton (2002) and Quayes (2012). This result showed there was the trade-off between the depth of outreach and the financial sustainability. This meant that CCIs 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 CCIs resulted in increasing more the depth of outreach, and leading to increase the financing costs and restrict the financial sustainability.

The variable CGR had a coefficient -10.80 with the significance level of 10%. This showed that increasing the credit growth rate reduced the financial sustainability of CCIs by 10.80 units per year. This result disagreed with the expected sign and hypothese, and disagreed with the analysis results of MkNelly and Stack (1998), Painter and MkNelly (1999), Tehulu (2013). Many CCIs used funding sources for lending, and this CCIs increased the credit growth rate from liabilities over the years. The increasing use of commercial funds in CCIs leading to increase the financing costs and restrict the financial sustainability. Beside, many CCIs increased the credit growth rate to increase their income, but the extra income was not commensurate with the increasing expenses in the past years.

The variable INC had a coefficient 0.0267 with the significance level of 1%, indicating that INC had a very strong impact on the financial sustainability. This result agreed with the expected sign and hypotheses, and agreed with the analysis results of Yaron (1992), Amit and Kedar (2014). There are tweenty-three out of tweenty-four CCIs that ensured operating income annually. This was a favorable condition that promoted the development of stable activities of CCIs in the recent period. Therefore, income was one of the factors promoting the high financial sustainability of CCIs in Vietnam.

The variable NAB had a coefficient 0.00329 with the significance level of 1%, indicating that NAB had a very strong impact on the financial sustainability. This result contrasts with the expected sign and hypotheses; at the same time, this result disagrees with the analysis results of Kinde (2012), Khan, Buttand Khan (2017). Many CCIs increased the number of active borrowers, expanded their operations, increased their income and contributed to the financial sustainability. This meant that CCIs focused on attaining the breadth of outreach goal was likely to provide microfinance products and service to many the clients and increase the financial sustainability. The CCIs achieve dual goals because of industry evolution that had caused the CCIs to strategically move towards for sustainability purposes and pursuing the poverty alleviation goals.

The variable NPL had a coefficient of -1.989 with the significance level of 1%, indicating that NPL had a very strong impact on the financial sustainability. This result agreed with the expected sign and hypotheses, and agreed with the analysis results of Khandker, Khalily and Khan (1995), Meyer (2002), Ha (2019b). Most of CCIs had low non-performing loan rate, which helped CCIs to ensure their operations were safety in the past years. Therefore, the increase in non-performing loan ratio would be a risk in the financial sustainability of CCIs in Vietnam.

6. CONCLUSIONS

The objective of this paper is studying the interactive relationships between social performance and financial sustainability of CCIs in Vietnam. The study showed three factors that have positive relationships with the breadth of outreach were the depth of outreach, deposit-to-loan ratio and financial sustainability. A factor that had negative relationships with the breadth of outreach was the age of CCIs. The non-performing loan had insignificant relationships with the breadth of outreach of CCIs. Three factors that had positive relationships with the depth of outreach were the age of CCIs, credit size and debt-to-equity ratio. A factor that had a negative relationship with outreach the depth of outreach was the financial sustainability. The size growth of CCIs had an insignificant relationship with the depth of outreach of CCIs.

This study also showed that two factors that had positive relationships with the financial sustainability of CCIs were the income and the breadth of outreach. Three factors that had negative relationships with the financial sustainability of CCIs were the depth of outreach, credit growth rate and non-performing loan. The capital adequacy ratio and deposit growth rate had insignificant relationships with the financial sustainability of CCIs.

At the same time, this study found relationships between the social performance and the financial sustainability of CCIs. Particular, this study found bidirectional interactions and the causal relationships between the breadth of outreach and the financial sustainability of CCIs in positive trend. While, there was a trade-of between the depth of outreach and the financial sustainability of CCIs.

This study offers policy implication and new insights, and further emphasizes optimal policies to CCIs management to change the decision-makers' perception of CCIs the following to increase social performance and financial sustainability.

Firstly, this study finds bidirectional causal interactions between breadth of outreach and financial sustainability with each other in a positive trend. Thus, the immediate policy recommendation from this study would support the encouragement of CCIs to emphasize on breadth of outreach and financial sustainability of CCIs.

Secondly, CCIs should be massive mobilization of clients to boost the number of active borrowers. At the same time, the CCIs should focus on deposit mobilization, creating the capital source to meet the needs of many borrowers. Thereby, it contributes to increase the breadth of outreach and financial sustainability.

Thirdly, CCIs need to strict control over credit growth quality and efficiency are necessary to ensure the financial sustainability. On the other hand, CCIs should expand the operations, and the operations of CCIs ensure to comply with the cooperative principles to enhance mutual support and cooperation among members, focus on the main purpose of mutual

assistance in production, business development, the life of its members and serving communities in the area that contributes to increase their income and promote the financial sustainability.

Fourthly, CCIs are credit institutions that are allowed to mobilize deposit to lend to its members. Therefore, to ensure financial sustainability, CCIs must follow the general principle of ensuring safety for banking operations.

Fifthly, CCIs need to balance sufficient resources to ensure their operational objectives. At the same time, strengthen solutions to limit the trade-off between depth of outreach and financial sustainability, thereby contributing to increase financial sustainability of CCIs.

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