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Research Article

The Interactive and Causal Relationship between Productivity and Financial Sustainability of People's Credit Funds in Vietnam

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Abstract

Productivity and financial sustainability are the most complex areas of financial decision making due to its interrelationship with other financial decisions variables. At the same time, productivity and financial sustainability are factors affecting the operations and the goals of people's credit funds (PCFs) in Vietnam. The purpose of this study is to discover the interaction and causal relationship between productivity and financial sustainability and to examine factors that affect productivity and financial sustainability of PCFs. After regression analysis on a set of panel data from 2013 to 2018 of twenty-four selected PCFs in Vietnam, it appears that deposit, credit growth rate and financial sustainability have positive relationships with productivity; depth of outreach has a negative relationship with productivity. Productivity, capital adequacy ratio, income have positive relationships with financial sustainability; credit growth rate has a negative impact on financial sustainability. The study finds bidirectional interactions and the causal relationship between productivity and financial sustainability. Based on the findings the study proposes policy measures that could be implemented by the managers of PCFs to increase productivity and ensure a more efficient distribution of economic resources. Beside, this study recommends that managers of PCFs and helps researchers, managers to understand the key determinants for better management of PCFs.

Keywords: Financial Sustainability, People's Credit Funds, Productivity

1. Introduction

People's credit fund is one of the institutions that provide microfinance services. The PCFs' operation has an important role in deepening and widening financial inclusion in the country. They contribute the socioeconomic development by bridging the financial exclusion gap by pooling members' savings together for on-lending to the same members. With this orientation, PCFs in Vietnam increase productivity and need to ensure the balance of the social and financial sustainability goals. However, productivity is very low and tends to decrease; besides, financial sustainability of many PCFs has fluctuated over the years, affecting the ability to expand the scale of the financial service provision. There has been some researches on PCFs operations in Vietnam; but, there has been no research on the interactive and causal relationships between productivity and financial sustainabilty.

This study's purpose was to discover the reciprocity between productivity and financial sustainability and to examine factors that affect PCFs' productivity and financial sustainability. By studying this aspect of Vietnam and from the findings on the relationships between productivity and financial sustainability, as well as the impact of the factors on productivity and financial sustainability

of PCFs, the study contributed to the knowledge gap in the literature on the interactive and causal relationship between productivity and financial of PCFs. Therefore, the study of the interactive and causal relationships between productivity and financial sustainability of PCFs is one of the urgent issues to understand the relationship and impact trend to increase productivity and advance financial sustainability of PCFs in Vietnam. In particular, this study offers policy implication and new insights, and further emphasizes optimal policies to PCFs management to change the decision-makers' perception of PCFs. So, they can develop a management strategy to increase their productivity and financial sustainability.

2. Literature Review

The PCFs operated for the purpose of promoting thrift, arranging credit at competitive rates, and they offer the same financial services provided by banks to their members and clients. Therefore, people's credit fund is a form of co-operative credit institution operating on the principles of voluntary action and self-accountability. People's credit fund is a legal entity that provides microfinance services with the main purpose of mutual assistance in production and business development and life. To play this important role, one of the requirements for PCFs is ensuring productivity growth and financial sustainability.

2.1 Productivity

The definition of productivity usually depends on the objective of the analysis. In microfinance sector, the productivity indicators of microfinance institution measured as the number of active borrowers by the total number of staff show how efficiently the available human resource was utilized (Rauf and Mahmood, 2009). The staff productivity ratio was calculated by dividing the number of active borrowers of a microfinance institution by the total number of staff (Rashid and Twaha, 2013). Basharat, Arshas And Khan (2014) revealed that productivity was measured regarding work load of loan officers in microfinance. The previous literature showed that productivity can be measured in different ways. In this study, the PCFs' productivity was computed by dividing the number of active borrowers by the total number of staff. The productivity is associated with all credit institutions operations and is influenced by many factors, including:

First, depth of outreach: The depth of outreach was measured by the average loan size (Ledgerwood, 1999) and according to the research results of Rashid and Twaha (2013) showed that the average loan size appears to have an inverse relationship with productivity. However, the empirical results of Adhikary and Papachristou (2014) on the connection between the depth of outreach and productivity suggest a positive relation.

Secondly, credit growth rate: MicroRate (2014) showed that productivity has been decreasing in development markets. This was it becoming more difficult to find good borrowers. Thus, the mature markets where is it becoming more difficult to promote the credit growth, and decrease productivity of microfinance institutions. According to Abrar (2018), microfinance institutions build a strong client base which in the future results in greater productivity and as competition increases, it puts more pressure on microfinance institutions and tend to increase their productivity. Therefore, as competition increases, microfinance institutions promote the credit growth and increase their productivity.

Thirdly, deposit: Using mobilized funds for loan capital can provide depositors with a feeling of ownership towards the microfinance institutions where they are clients, which can further increase the adaptability and responsiveness of the microfinance institutions to their clients. Beside, a larger number of clients can be reached through saving operations (Fiebig, Hannig and Wisniwski, 1999). According to Churchill and Marr (2017), increasing in the number of savings account would help microfinance institutions expand the breadth of outreach microfinance institutions. Therefore, deposit has a positive impact on productivity of microfinance institutions.

Fourth, debt-to-equity ratio: According to Abdulai and Tewari (2017), debt-to-equity ratio was included as the capital structure variable. The availability and use of debts by microfinance institutions helped to increase their capital base and also propel microfinance institutions towards achieving many borrowers. Ha (2019) showed there was a positive relationship between the debt-to-equity ratio and productivity of microfinance institutions. However, the research results of Towo, Mori and Ishengoma (2019) found that an increase in financial leverage results in lower microfinance institutions' productivity. This showed that the financial leverage has a negative effect on labor productivity of microfinance institutions.

Fifthly, financial sustainability: The study of Adhikary and Papachristou (2014) showed there was a positive relationship between the microfinance institutions' financial sustainability and productivity. On the other hand, Abrar and Javaid (2016) showed that if a microfinance institution was not the financial performance, the credit quality depreciates, which further signals a lack of financial sustainability, and low productivity at microfinance institution. Therefore, the financial sustainability had a positive impact on the productivity of microfinance institutions. The econometric estimation results of Wassie, Kusakari and Sumimoto (2019) showed that personnel productivity had a positive and significant impact on the financial performance including financial self-sufficiency of microfinance institutions.

2.2 Financial sustainability

Sustainability is the goal of many sectors and fields in countries around the world, each country relies on economic and social characteristics to plan the most suitable strategy for sustainable development. For an ideal microfinance institution, this means the ability to continuously operate. A microfinance institution will have financial sustainability if the revenue it generates from operations cover It's operating expenses, financing costs, loan loss provisions and cost of capital (Ledgerwood, 1999). Therefore, financial sustainability in PCFs refers to the ability of institutions to cover their operating expenses, financing costs, loan loss provisions and cost of capital from their operating revenues.

The financial sustainability is a tangible parameter that is measured continuously to monitor the level of income to cover all costs to guarantee the long-term development of PCFs. The financial sustainability is associated with all PCFs activities and is influenced by many factors, including:

Firstly, productivity: Ganka (2010) found that when the number of active borrowers grows causing unsustainability. Because the staff fail to manage borrowers in the rural microfinance institutions. This showed there was a negative relationship between the productivity and financial sustainability of rural microfinance institutions. According to Usman, Ahmed, Mehmood and Haq (2016), increasing in the productivity contributed to advance the financial performance of microfinance institutions. Thereby, the productivity had increased the financial performance and impact on financial sustainability in positive trend.

Secondly, capital adequacy ratio: Capital adequacy ratio reflected the structure and sufficiency of the capital of PCFs. This ratio was one of the important factors affected the operations and sustainability of microfinance institutions since capital adequacy ratio ensured lenders and depositors to have confidence in the microfinance institutions relative (Ledgerwood, 1999). Ha (2019b) found that there was a positive relationship between the capital adequacy ratio and operational self-sustainability of PCFs. Thereby, the capital adequacy ratio had a positive impact on the financial sustainability of PCFs.

Thirdly, credit growth: According to MkNelly and Stack (1998), there was a significant relationship between sustainability and the growth in the loan size, and the research result of Painter and MkNelly (1999), the loan growth was important and had positive impacts on financial sustainability. Another study showed that financial sustainability of microfinance institutions was positively and significantly driven by lending intensity and size (Tehulu, 2013).

Fourthly, income: According to Yaron (1992), microfinance institutions achieved the financial

sustainability when their income exceeded the costs. Amit and Kedar (2014) revealed that profit-motivated microfinance institutions had a higher rate of sustainability compared to non-profit microfinance institutions. People's credit fund is one of the institutions that provide microfinance services that are profit-motivated; thus, the income will affect the financial sustainability of PCFs.

Fifthly, non-performing loan ratio: The study result of Khandker, Khalily and Khan (1995) pointed that loan repayment could be another indicator for financial sustainability. Beside, according to Meyer (2002), financial sustainability required financial institutions to maintain good financial status, the financial un-sustainability in financial institutions raised due to low repayment rate.

3. Research Methodology

In this paper, the selection of twenty-four PCFs Vietnam are PCFs that have been operating for a long time, starting from the first years of pilot activities of PCFs to date. PCFs have operating time of 18 years or more, they have large lending and mobilizing scales and have a high number of members. The data of productivity, financial sustainability and determinant factors were collected from international journals, books, etc. Primary data is collected from financial reports of twenty-four PCFs selected in Vietnam from 2013 to 2018. The analysis model of the causal and interactive relationship between productivity and financial sustainability of PCFs was established as follows:

$$Y_1 = \alpha_{10} + \alpha_{11}Y_2 + \sum_{k=1}^{n} \beta_{1k}X_{1k} + \mu_1 \qquad (1)$$

$$Y_2 = \alpha_{20} + \alpha_{21}Y_1 + \sum_{\gamma=1}^{m} \beta_{2\gamma} X_{2\gamma} + \mu_2 \qquad (2)$$

Where,

Y_1 is a variable that measures productivity, determined by the number of active borrowers by the total number of staff. Y_2 is a variable that measures financial sustainability, determined by the ratio of operating income to total operating expenses, financing costs, provision for loan losses and cost of capital. X_{1k}, $X_{2\gamma}$ are the independent variables that can affect profitability and financial sustainability in equations (1) and (2), 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, indicator *t* represents the number observed year and indicator *i* represents the number of observations.

This study tests the following hypothesis on the relationship between the productivity and the independent variables.

H1.1: There is a positive or negative relationship between the depth of outreach and productivity of PCFs.

H1.2: There is a positive relationship between the credit growth rate and productivity of PCFs.

H1.3: There is a positive relationship between the deposits and productivity of PCFs.

H1.4: There is a positive or negative relationship between the debt-to-equity ratio and productivity of PCFs.

H1.5: There is a positive relationship between the financial sustainability and productivity of PCFs.

This study tests the following hypothesis on the relationship between the financial sustainability and the independent variables.

H2.1: There is a positive or negative relationship between the productivity and financial sustainability of PCFs.

H2.2: There is a positive relationship between the capital adequacy ratio and financial sustainability of PCFs.

H2.3: There is a positive relationship between the credit growth and financial sustainability of PCFs.

H2.4: There is a positive relationship between the income and financial sustainability of PCFs.

H2.5: There is a negative relationship between the non-performing loan ratio and financial sustainability of PCFs.

The Stata 15.0 software was used in this study and 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 productivity		
Dependent variable		
Productivity: Numbers of borrowers on number of staff ratio (BSR)	Numbers of borrowers / Number of staff	
Independent variables		
Depth of outreach (ALB)	The average loan per borrower	H1.1: +/- (high ALB, high or low BSR)
Credit growth rate (CGR)	Growth in loan outstanding	H1.2: + (high CGR, high BSR)
Deposit (DEP)	Total deposit	H1.3: + (high DEP, high BSR)
Debt-to-equity ratio (DER)	Total liabilities / Total equity	H1.4: +/- (high DER, high or low BSR)
Financial self - sustainability (FSS)	Operating income / (Operating expenses + financing costs + provision for loan losses + Cost of capital)	H1.5: + (high FSS, high BSR)
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		
Productivity: Numbers of borrowers on number of staff ratio (BSR)	Numbers of borrowers / Number of staff	H2.1: +/- (high BRS, high or low FSS)
Capital Adequacy Ratio (CAR)	Total Capital / Risk Weighted Assets	H2.2: + (high CAR, high FSS)
Credit growth rate (CGR)	Growth in loan outstanding	H2.3: + (high CGR, high FSS)
Income (INC)	Operating income	H2.4: + (high INC, high FSS)
Non-performing loan ratio (NPL)	Non-performing loans / Total loans	H2.5: - (High NPL, low FSS)

By combining data in two dimensions, 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), and these estimate suggested that a better way to model the data. 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 productivity, financial sustainability, and the relationships between PCFs' productivity and financial sustainability.

4. Research Results

4.1 Descriptive statistics

The results of descriptive statistics of both dependent and independent variables showed that ALB, BSR, CAR, CGR, DER, FSS, NPL variables had smaller standard deviations than the average. DEP, INC variables have fluctuation because the PCFs' deposit and income had the large difference from 2013 to 2018.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ALB	144	79.26924	38.39884	22.09	293.88
BSR	144	66.96868	26.18042	23.71	137.4
CAR	144	18.04	6.779657	8.02	41.15
CGR	144	.0669514	.1466846	-.214	1.087
DEP	144	123437.2	144930.8	11892	587004
DER	144	11.32847	4.022083	3.35	22.14
FSS	144	110.6	8.160111	68.4606	137.667
INC	144	204.5032	239.9829	-90.17	1054.21
NPL	144	1.201736	1.189866	0	6.34

Source: Authors' calculation from Stata 15.0.

4.2 Correlation analysis

The correlation analysis between variables in the model showed a very low degree of correlation among the variables. Hence, the presence of any multicollinearity was neglected as can be seen in Table 3.

Table 3. Correlation matrix

	BSR	ALB	CGR	DEP	DER	FSS
Correlation matrix for factors affecting productivity						
BSR	1.0000					
ALB	-0.3018	1.0000				
CGR	0.0434	-0.0534	1.0000			
DEP	0.2928	0.5196	-0.1566	1.0000		
DER	0.0618	0.2612	0.2035	0.3067	1.0000	
FSS	0.3982	-0.2407	-0.2266	-0.0119	-0.2620	1.0000
Correlation matrix for factors affecting financial sustainability						
	FSS	BSR	CAR	CGR	INC	NPL
FSS	1.0000					
BSR	0.3982	1.0000				
CAR	0.2274	-0.0457	1.0000			
CGR	-0.2266	0.0434	-0.1833	1.0000		
INC	0.2835	0.3609	-0.1182	-0.1636	1.0000	
NPL	-0.4160	-0.2775	0.0204	0.0506	-0.1268	1.0000

Source: Authors' calculation from Stata 15.0.

4.3 Regression results

Using 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 FEM and performed the random effects estimation according to REM and comparison with OLS between BSR dependent variable and ALB, CGR, DEP, DER, FSS independent variables.

The result of the fixed effects estimation and random effects estimation 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 the fixed effects estimation and random effects estimation found there were positive relationships between variables CGR, DEP, FSS and the

variable BSR at the significance level of 10%, 1% and 1%, respectively; there was a negative relationship between variable ALB and the variable BSR at the significance level of 1%, variable DER was not statistically significant, although this variable has a positive impact on the variable BSR as can be seen in Table 4.

This research performed the Hausman test and tested for the statistical significance of difference between the coefficients estimates obtained by FEM and by REM. Hausman test result obtains a P-value of 0.1912, greater than the significance level of 5 % and this study chose the result between FEM and REM with REM was more suitable than FEM. In comparison to OLS Pooled model, REM was more suitable than OLS Pooled model. Hence, the random effects model 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 = 1.66, VIF of variables from 1.27 to 2.03.

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 checked the autocorrelation with the model, P-value = 0.1833 was greater than 0.05. This result did not have serial correlation in the model.

Table 4. Regression results for factors affecting productivity

Independent variables	Dependent variable (BSR)	
	REM	**FEM**
ALB	-0.362*** (-7.05)	-0.342*** (-6.13)
CGR	29.44* (2.50)	26.83* (2.17)
DEP	0.000104*** (7.52)	0.0000994*** (7.06)
DER	0.511 (1.14)	0.527 (1.12)
FSS	1.075*** (4.98)	1.171*** (5.12)
_cons	-43.80	-55.54*
P-value	0.0000	0.0000

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

Source: Authors' calculation from Stata 15.0.

Using 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 FEM and performed the random effects estimation according to REM and comparison with OLS between FSS dependent variable and BSR, CAR, CGR, INC, NPL independent variables.

The result of the fixed effects estimation and random effects estimation 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 the random effects estimation found there were positive relationships between variables BSR, CAR and INC and the variable FSS at the significance level of 1%, 1% and 10%, respectively; there were negative relationships between variables CGR, NPL and the variable FSS at the significance level of 10% and 1%, respectively. In the fixed effects estimation found there were positive relationships between variables BSR, CAR and the variable FSS at the significance level of 5% and 1%, respectively; there were negative relationships between variable CGR, NPL and the variable FSS at the significance level of 10% and 1%, respectively, variable INC was not statistically significant, although this variable has a positive impact on the variable FSS as can be seen in Table 5.

This research performed the Hausman test and tested for the statistical significance of difference between the coefficients estimates obtained by FEM and by REM. Hausman test result obtains a P-value of 0.8955, greater than the significance level of 5 % and this study chose the result between FEM and REM with REM was more suitable than FEM. In comparison to OLS Pooled model, REM was more suitable than OLS Pooled model. Hence, the random effects model 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 = 1.29, VIF of variables from 1.13 to 1.59.

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 checked the autocorrelation with the model, P-value = 0.8806 was greater than 0.05. This result did not have serial correlation in the model.

Table - 5. Regression results for factors affecting financial sustainability

Independent variables	Dependent variable (FSS)	
	REM	**FEM**
BSR	0.0856*** (3.64)	0.0762** (3.24)
CAR	0.283*** (3.39)	0.303*** (3.81)
CGR	-8.639* (-2.20)	-9.348* (-2.41)
INC	0.00498* (1.97)	0.00455 (1.89)
NPL	-2.182*** (-4.52)	-2.285*** (-4.92)
_cons	101.9***	102.5***
P-value	0.0000	0.0000

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

Source: Authors' calculation from Stata 15.0.

5. Discussions

5.1 Discussions of factors affecting productivity

The result of the random effects estimation in Table 4 show that the depth of outreach had a coefficient -0.362 with the significance level of 1%. This suggested that extending loans to the clients reduced the productivity of PCFs by 36.2%. This result was similar to the analysis of Rashid and Twaha (2013). The clients were being served and serving the clients of PCFs required more inputs, which adversely affected the productivity of PCFs. On the contrary, this result was not consistent with the analysis results of Adhikary and Papachristou (2014). Due to limit capital, the low average loan per borrower facilitates PCFs to provide loans to more borrowers. The fact that PCFs had a lower average loan per borrower, the higher productivity over the years.

The credit growth ratio had a coefficient 29.44 with the significance level of 10%. This showed that increasing loans contributed to advance the productivity of PCFs by 29.44 units per year. This result agrees with the expected sign and hypotheses; at the same time, this result agrees with the analysis results of MicroRate (2014) and Abrar (2018). The PCFs built the strong the member and client base which in the period 2013-2018, the PCFs were more advantage to promote the credit growth and increase their productivity.

The deposit had a coefficient 0.000104 with the significance level of 1%. This showed that

increasing the deposit contributed to advance the productivity of PCFs by 0.0104%. This result was similar to the analysis of Churchill and Marr (2017). The PCFs' mobilization operation increased and attracted many clients which have contributed to increase their productivity from 2010 to 2018.

The financial sustainability had a coefficient 1.075 with the significance level of 1%. This found that increasing the financial sustainability contributed to advance the productivity of PCFs by 1.075 units per year. This result agrees with the analysis results of Adhikary and Papachristou (2014), Abrar and Javaid (2016), Wassie, Kusakari and Sumimoto (2019). In addition to other goals, financial sustainability was one of important goals of PCFs that contribute to promote their productivity. PCFs' financial sustainability had a positive impact on productivity and this study result showed that many PCFs were profitable, which further signaled the more financial sustainability the higher the productivity at PCFs.

The results of this research were accurate according to the characteristics of PCFs and the development process of PCFs in Vietnam from 2013 to 2018. Many PCFs improved the deposit mobilization operation, credit growth and increasing financial sustainability. On the other hand, this study did not find a statistically significant impact between variable DER and BSR. This was consistent with the fact that PCFs step by step improved capital adequacy ratio by supplementing charter capital to provide financial services and loans under the conditions of low equity in the past years.

5.2 *Discussions of factors affecting financial sustainability*

The result of the random effects estimation in Table 5 show that the productivity had a coefficient 0.0856 with the significance level of 1%. This implied that increasing the productivity contributed to advance the financial sustainability of PCFs by 8.56%. This result was similar to the analysis of Usman, Ahmed, Mehmood and Haq (2016). This result showed that increasing the productivity resulted into more than the financial sustainability. The fact that many PCFs had a higher the productivity, the higher financial sustainability over the years.

The capital adequacy ratio had a coefficient 0.283 with the significance level of 1%. This showed that increasing the capital adequacy ratio contributed to advance the financial sustainability of PCFs by 28.3%. This result was similar to the analysis of Ledgerwood (1999). In recent years, PCFshave always maintained a capital adequacy ratio of over 8% to meet the requirements of the operational development. Therefore, a high capital adequacy ratio contributed positively to improve the financial sustainability of PCFs in Vietnam.

The credit growth ratio had a coefficient -8.639 with the significance level of 10%. This suggested that extending loans to the clients reduced the financial sustainability of PCFs by 8.639 units per year. This result disagreed with the analysis results of MkNelly and Stack (1998), Painter and MkNelly (1999), Tehulu (2013). There was a contradictory relationship between credit growth and financial sustainability. The PCFs increased the credit size to create income, but the extra income was not commensurate with the increasing expenses in the past years. There was a trade-off between credit growth and financial sustainability of PCFs in Vietnam.

The income had a coefficient 0.00498 with the significance level of 10%. This showed that increasing the income contributed to advance the financial sustainability of PCFs by 0.498%. This result agreed with the analysis results of Yaron (1992), Amit and Kedar (2014). There were 23 out of 24 PCFs that ensured operating income annually. This was a favorable condition that promoted the development of stable activities of PCFs and income was one of the factors promoting the high financial sustainability of PCFs in Vietnam.

The non-performing loan ratio had a coefficient -2.182 with the significance level of 1%. This suggested that increasing non-performing loan ratio led to reduce the financial sustainability of PCFs by 2.182 units per year. This result agreed with the analysis results ofKhandker, Khalily and Khan (1995), Meyer (2002). Most of PCFs had low non-performing loan rate, the financial sustainability in financial institutions arises due to high repayment rate which helped PCFs to ensure

their operations were safety in the past years. Therefore, the decrease in non-performing loan ratio advanced in financial sustainability of PCFs in Vietnam.

The results of this research are accurate according to the characteristics of PCFs and the development process of PCFs in Vietnam from 2013-2018. Every year, most of PCFs step by step improved capital adequacy ratio by supplementing charter capital, advanced the productivity and increasing operating incomes. Beside, non-performing loan ratio was concerned by many PCFs and most PCFs had low non-performing loan ratio.

6. Conclusions and Recommendations

The objective of this paper was studying the interactive and causal relationships between productivity and financial sustainability of PCFs in Vietnam. The results of the study showed the three factors that had positive relationships with the productivity of PCFs were the credit growth rate, the deposit and the fiancial sustainability. A factor that had a negative relationship with productivity PCFs was the depth of outreach. There was not relationship between the debt-to-equity ratio and productivity of PCFs. This study also showed the three factors that had positive relationships with the financial sustainability of PCFs were the productivity, the capital adequacy ratio and the income. The two factors that had negative relationships with the financial sustainability of PCFs were the credit growth rate and the non-performing loan ratio.

At the same time, this study found relationships between productivity and financial sustainability of PCFs. Particular, this study found bidirectional interactions and the causal relationships between productivity and financial sustainability of PCFs in positive trend.

This study offers policy implication and new insights, and further emphasizes optimal policies to PCFs management to change the decision-makers' perception of PCFs the following to increase productivity and financial sustainability:

Firstly, this study finds bidirectional causal interactions between productivity and financial sustainability with each other in a positive trend, so that the PCFs' operations should focus on both productivity and financial sustainability of PCFs.

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

Thirdly, in order for PCFs to succeed they must promote to maximize productivity by increasing financial sustainability. The PCFs should be massive mobilization of clients to boost the number of active borrowers. At the same time, the PCFs should focus on deposit mobilization, creating the capital source to meet the needs of many borrowers. Thereby, it contributes to increase their productivity and financial sustainability.

Fourthly, strengthening financial capacity by increasing charter capital, attracting new members. At the same time, PCFs strict control over credit growth quality and efficiency are necessary to ensure financial self-sustainability of PCFs.

Fifthly, PCFs need to balance sufficient resources to ensure their operational objectives. At the same time, strengthening appropriate solutions to achieve the productivity and financial sustainability goals.

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