Social Role of Microfinance Institutions in Poverty Eradication: Evidence from ASEAN-5 Countries

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Banking institutions have witnessed the failure of poverty reduction due to high risk service for poor people. Microfinance institutions (MFIs) were developed to provide financial services for low income households. In the drive to supply continuous financial services for the poor, performance of the MFIs has been one of the crucial aspects that needs consideration. The MFIs began with a social goal aim of poverty reduction. However, the commercialization of the MFIs has resulted in them becoming financially independent as they are funded by a previous government. Today the MFIs need to retain the social role, to eradicate poverty whilst at the same time they must strive to sustain long term operation. Are the MFIs still able to sustain their social goals when they also need to focus on financial sustainability? This study proposes to determine the level of social efficiency among MFIs in ASEAN 5 countries as the first objective. Secondly it will examine the impact firm characteristics that internally influence the social

efficiency of the MFIs. The data consists of 168 MFIs from Southeast Asia that covers five countries from the year 2011 to 2017. The first stage of analysis to identify the level of social efficiency by using non parametric Data Envelopment Analysis (DEA) approach. The second stage of analysis is to examine the impact of firm characteristics to influence the social efficiency by applying Multivariate Panel Regression Analysis (MPRA) as an estimation method. The findings reveal the MFIs in ASEAN 5 countries have a lower social efficiency. This indicates the MFIs in ASEAN 5 countries has traded their original mission of poverty reduction to focus more on achieving financial sustainability for long term viability.

Introduction

Microfinance Institutions (MFIs) is design as a provision of financial services mainly for poor income households. Lack of basic needs with daily income below the minimum level has meant that the poor cannot participate in economic activities since they are excluded from the formal financial system (Abdelkader and Mekar, 2013). To improve income, they need access to basic banking services so that they can fulfill social needs such as child education, health care, water and sanitation. Therefore in 1976, a Bangladesh economic Professor, Muhammed Yunus introduced the MFIs as a provision of financial services mainly to poor households.

The establishment of the MFIs has addressed the failure of traditional banks to deliver financial services to the poor. This is mainly due to the fact that poor clients are risky as they have no credit record, have low income and no collateral to guarantee for loan application. Other than that, high transaction costs are involved to deliver the credit since they are located in rural areas which make it difficult for the banks to reach them for behavior observation and verification (Dokulilova, Janda and Zetek, 2009; Kim & Le 2018). Furthermore, the MFI differentiates itself from formal banking institutions by allocating small loans to the poor, using various non-traditional plans such as, group lending, progressive loan structures, immediate repayment plans, regular repayment schedules and collateral-free loans.

Over the past twenty years, the MFIs have rapidly evolved and expanded from the relatively narrow field credit delivery system to the massive challenge of building wide-range financial services. The MFIs, initially funded by a government subsidy were in the late 1990's subject

to a paradigm shift from subsidy regime to commercialization of the MFIs. Roy and Goswami's (2013) study indicates at that point of time the MFIs are no longer donors and subsidy dependant and they started to generate their own funds by offering various banking products. The MFIs nowadays are unique in that they bring dual objectives of social education and financial outcomes. Nevertheless, the MFIs still retain the social role that is to eradicate poverty whilst yet at the same time they must strive to sustain long term operations.

Although the MFIs currently present a massive growth with a wide range of banking products on offer to clients, the report from United Nations Development 2015 revealed, almost half of the world's population earn less than USD1.90 daily, a level declared poverty. Moreover, the statistics from UNICEF 2015 reported that over 22,000 children die each day due to the poverty. This condition brings to light a necessary argument on the commercialization of the MFIs as they switch from their social function to focus more on financial sustainability and the effort to eradicate poverty when there is an increasing number of people experiencing poverty around the world. In this context, this research aims to determine the level of social efficiency among MFIs in ASEAN 5 countries as the first objective. Secondly it will examine the impact of firm characteristics that internally influence the social efficiency of the MFIs. The remainder of this paper is organized as follows. Section 2 presents an overview of the existing theoretical and empirical literature on the social efficiency of the MFIs and the determinants. Section 3 discusses the estimation method and model to achieve the objectives of the study. In section 4 we show the results of the empirical investigation of the impact of firm characteristics to influence social efficiency of MFIs. Section 5 provides a summary and conclusions.

Literature Review

The commercialization of the MFIs in the late 1990's initiated a paradigm shift in MFI industry. From this point of time, the MFIs were no longer subsidized and donor dependent, rather they began to generate their own income by offering more banking products (Wagner and Winkler, 2013). The MFIs now model a dual characteristic as they need to achieve financial stability in parallel with social outreach to eradicate poverty. The main theory of support that is reflected in this research is theory of production by Cobb Douglass. Cobb Douglas (1928) expects in an economic sense, a firm to believe that it is behaving efficiently. He constructs the theory of production as a function of capital, labour, production, value and wages for the manufacturing industries.

Forsund and Hjalmarsson (1974) noticed that the production function should be considered in light of technologies. The common indicator of efficiency in the industry is the 'frontier

production function' or 'best practices'. Groose (1953) and Salter (1960) suggest this concept best fits either the most efficient blueprint technology or the most efficient use of inputs. The frontier production function shows the maximum output yields for a given set of inputs (Aigner and Chu, 1968). Another topic that is frequently recognized is productivity in measurement of efficiency. Innes and Mitchelle (1990) describe efficiency as the ratio of total output over total input. Thus, to indicate productivity is see how the available resources are present together and engaged to achieve the desired results (Bain, 1982). Kopleman (1986) explains productivity as the relationship between the single or more physical outputs of the related physical inputs that are involved in the production. Moreover, Burger and Humphrey (1997) expand the production function recommended by Cobb Douglas (1928) to the financial institution by concentrating on financial efficiency. The efficiency of the financial sector highlights the efficient allocations of financial resources that are essential to stimulate productivity. This specifies that the economy has the chance to transform the input of saving resources for more profitable output such as investments.

The MFIs began its operation with its primary goal of social outreach with the goal of poverty alleviation. The social goal of the MFIs is to ensure poor people benefit from the financial services offered. Previous literature determines the social goal of MFIs as a social value of output produced by MFIs. It comprises six aspects; depth, breadth, length, scope, worth of users, and cost to users (Schreiner, Churchill, Meyer, Morduch, and Navajas, 2002). The depth of outreach shows the ability of the MFIs to penetrate deeper to effect the poorest while breadth is defined as the number of poor borrowers that has been served by the MFIs. In addition to this, the length of outreach explains the time frame where the service delivered to poor people and scope of outreach refers to variation of financial services provided to poor people. Besides that, worth of users is definedd as how financial services provide by the MFIs meet the needs of poor clients and cost to users is measured by the amount of interest and fee charges by the MFIs for the services provided. Among these approaches, the present study focused on the depth and breadth of outreach to measure social efficiency (Quayes, 2012; Węziak-Białowolska, 2015).

Assefa, Hermes and Meesters (2013) investigate the impact of competition on the social and financial performance of the MFIs. The social performance was determined via access to a number of borrowers. By using the Lerner Index to compute competition, this study found negative correlation with the social performance of the MFIs. This is consistent with Widiarto and Emrouznejad (2015) who examined the social and financial performance of Islamic and conventional MFIs. The result indicated conventional MFIs outperform Islamic MFIs in financial and social efficiency and showed conventional MFI is mature and stable to achieve

both efficiencies while Islamic MFI is still in an infant stage and needs to develop to perform better in the future.

Moreover, the size and age are found to influence the performance of MFI from the aspect of social outreach and financial performance. By using the non-parametric DEA approach, Wijesiri, Yaron and Meoli (2015) prove that the older MFIs lower the social outreach but size improves on both aspects of social and financial aspects. They mentioned that as MFIs age, more product has been offered thus overlooking lending to poor people as the core to accomplish initial social objective. However, there are some arguments between which of social and financial efficiency is the better performance indicator for MFIs. The study from Schreiner *et al.,* (2002) implied that when there is conflicting objective between social and financial sustainability thus a trade-off exists. He mentions social outreach is achievable by surrendering the financial sustainability or by relying more on donations or subsidies. Bedecarrats (2012) examines the relationship between social and financial performance in the MFIs. They revealed that social and financial performances are compatible and servicing the poor clearly involves higher costs for the MFIs. In contrast with the above studies, Paxton and Cuevas (2002) argued with Schreiner *et al.,* (2002) as their study proved MFI can solve the objectives trade-off when they found the arrangement of small loans can minimizes costs. Later, the same view was framed by Quayes (2012) who revealed group loan schemes essentially cut costs in lending small loans and hence diminish the trade-off.

Incorporated with the level of social efficiency, a firm's characteristic variables have been found to explain the effect on the social performance of the MFIs, particularly in firm level that can be influenced from the internal control of the firm. It explains that there are variables can be controlled by the organization to affect the performance level of the MFIs. Among them, (1) Size, (2) Age, (3) Profitability and (4) Leverage are found to be the most prominent internal variables to influence the level of MFI efficiency (Singh, Goyal, and Sharma, 2013 and Wijesiri *et al.* 2015).

Much research has been conducted to find internal factors to influence efficiency. Among them, (Singh et al., 2013; Imai, Gaiha, Thapa and Annim, 2012 and Wijesiri *et al.,* 2015) the size of operation has a positive relationship with the performance of the MFIs. It is clearly shown that larger MFIs operate in a more cost effective way as compared with smaller MFIs that rely on labor and time with outdated methods affecting performance. However, in contrast with Widiarto and Emrouznejad (2015) where the size of the MFIs is found to be negatively correlated with social and financial efficiency, they suggested that MFIs become larger in size when they start to offer more banking products. This operation switches focus

more to financial sustainability the original mission of social efficiency, that is to eradicate poverty, is lost. In addition, the study also explains that although the MFIs's size is large, the technology used to support the operation is somehow outdated. The study from Wijesiri *et al.* (2015) clarified the lack of technology advance may affect the efficiency of the MFIs since they manually rely on labor to operate the business. In addition, they fail to deliver products to customers in a more effective way such as online banking that provides a cost saving to the MFIs.

Empirical literature suggest age of operation could influence the performance level of the MFIs. Hartarska and Nadolnyak (2007) found the age of MFI is significant with the outreach to a poor borrower. They conclude that as MFIs age, they increase the number of poor borrowers being served but this only represents one dimension of outreach, that is breadth not depth. Further, Wijesiri *et al.,* (2015) found that the age of operation slowed down the outreach of the MFIs. The findings show that as MFIs age, they reduce the total number of poor borrower representation. This is mainly due to the fact that most of the MFIs change their ownership to allow them to offer more products that are similar with commercial banks rather than to focus on lending to poor people. This has contributed to divert MFIs from an initial focus to serve poor people.

Wijesiri *et al.,* (2015) find the Debt to Equity Ratio (DER) brings a negative implication to social outreach. It implies the MFIs do not really depend on their sources of fund through debt financing to achieve social and financial performance. This is mainly due to debt financing not being regularly used in the MFIs as a main sources of financing since their focus is more on the social objective to eradicate poverty than to provide high volume financial products as offered by commercial banks. In contrast, Kar (2012) justified the positive and significant DER with number of active borrowers. He suggested the MFIs nowadays produce better outreach level as a result of lending activities. This condition helps in extracting premiums from the loans previously disbursed then supports the fund flow of the MFIs that could later be used to produce more loans that reaching the poor.

While Lebovics, Hermes and Hudon (2014) include Return on Asset (ROA) as a proxy for profitability in the model estimation, they revealed social efficiency is positively correlated with ROA. The outputs propose a good financial performance offers the MFIs with better chances to promote outreach. On the other hand, some researchers found that profitability is not significant with social efficiency. This assumption arose from the study of Wijesiri *et al.,* (2015) where the main expectation from a donor is to penetrate poverty despite the fact that it involved higher transaction costs per small loan. This situation isn't a deterrent as long as social objectives are achieved while the MFIs are making profit or loss. In this research the conclusion appears to be that the social aim and profitability are no longer compatible.

From the literature, the present study develops two main hypotheses;

I.   *H1*: Social efficiency levels are significantly lower among Microfinance Institutions in ASEAN 5 countries.

II. *H2*: Firm Characteristics have a significant impact on social efficiency of the Microfinance Institutions among ASEAN 5 countries.

Data and Research Methodology

The data on the MFIs were collected from the Microfinance Information Exchange (MIX) database, a web-based platform that comprises of extensive social information of the global MFIs (Widiarto and Emrouznejad, 2015; Vanroose and D'Espallier, 2013; Assefa *et al.*2013). Following the study by Vanroose and D'Espallier (2013), who justify the MIX market as the biggest online database of the MFIs now widely used in the microfinance literature. According to Hassan, Sanchez, and Ngene (2012), the current database of the MIX market comprises 4440 MFIs from nine regions all over the world. To ensure the reliability of the data, the MIX market applied a diamond rating system indicating the quality and the transparency of the data attained from the MFIs. The rating ranges from 1 to 5 indicating higher levels of diamonds show the higher level of transparency and data quality (Widiarto and Emrouznejad, 2015; Vanroose and D'Espallier, 2013 and Quayes, 2012).

Data is selected from the Southeast Asian region or ASEAN 5 countries that consist of Malaysia, Indonesia, Thailand, Cambodia and Philippines. The main idea is to include ASEAN 5 countries in data estimation due to the majority of them comprising developing countries that present with high levels of poverty and have MFI provision (Porvazník, Vydrová, & Ljudvigová, 2017). The study sample consists of 168 MFIs from ASEAN 5 countries from the year 2011 until 2017. There sre 1176 data observations to be included in the data estimation.

This study consist of two stages of analysis to determine the level of social efficiency and the impact of firm characteristics of the MFIs in ASEAN 5 countries. In the first stage of analysis, Data Envelopment Analysis (DEA) is used to achieve the first objective that is to determine the level of social efficiency. This is followed with Multivariate Panel Regression Approach in the second stage of analysis. The analysis of this stage is undertaken to achieve our second objective to find the significant influence on firm characteristics to the level of social efficiency of the MFIs.

First Stage Analysis – Data Envelopment Approach (DEA)

The DEA was first introduced by Charnes, Cooper and Rhodes (1978), famously known as a CCR model after their names, it is a generalization of efficiency as initially proposed by Farrell (1957). However, the CCR model is calculated with constant returns to scale (CRS) assumption. This assumption is not suitable in imperfectly competitive markets. The BCC model proposed by Banker, Charnes and Cooper (1984) modifies the CCR model by allowing variable returns to scale (VRS). To achieve the objectives, this study employs estimates efficiency under the assumption of VRS. The CCR model assumes that there is no significant relationship between the scale of operations and efficiency by assuming CRS delivery overall technical efficiency. The CRS assumption is only justifiable when all Decision Making Units (DMU) are operating at an optimal scale. However, firms or DMUs in practice might face either economies or diseconomies of scale. Thus, if one makes the CRS assumption when not all DMU are operating at optimal scale, the computed measures of overall technical efficiency will be contaminated with scale inefficiency (SIE).

Additionally, Banker, Charnes and Cooper (1984) extended the CCR model by relaxing the CRS assumption. The result from the BCC model was used to assess the efficiency of DMU characterized by VRS. The VRS assumptions provides the overall efficiency (TE) score that decomposed into Pure Technical Efficiency (PTE) and Scale Efficiency (SE). The PTE measures the DMUs in term of managerial efficiency without being contaminated by scale. While the SE indicates the optimal size of DMU operation. Therefore, VRS results may provide more reliable information on the DMUs efficiency rather than the CRS (Coelli, Prasada and Battese, 1998 and Sufian, 2009). In regard to the study, the social and financial efficiency of the MFIs is measured by the TE that indicates overall score of efficiency

By employing both CRS and VRS methods, in case that there are differences in TE scores of a particular DMU, it appears that the DMU has Scale Inefficiency (SIE). In simple words, the SIE is computed by the differences between the VRS PTE score and CRS TE score (Coelli et al., 1998). Indeed, the nature of SIE under VRS due to either increasing return to scale (IRS) or decreasing return to scale (DRS) is determined by running additional DEA problems with non-increasing return to scale (NIRS) (Sufian, 2004; Kamarudin, Sufian, Nasir and Anwar, 2015). The IRS is referred to as an increase in inputs resulting in a higher increase in outputs; while the DRS is referred to as an increase in inputs resulting in lower increase in outputs (Kamararudin et al., 2015; Kundi and Sharma, 2016; Kurowska, Myck, & Wrohlich, 2017).

Diagram 3.1 below indicates the CRS and VRS frontiers in DEA. Under CRS assumption, the technical inefficiency of point B is the distance of BBc; while under VRS assumption, the technical inefficiency is only the distance of BBv. Thus, the SIE is the differences of BcBv.

By conducting an additional DEA problem with NIRS, the information whether a DMU is operating a field of IRS or DRS is provided. The differences between NIRS TE and VRS TE score determines the nature of SIE due to either IRS or DRS. If VRS TE or PTE is different from NIRS TE, the DMU therefore is operating at IRS (point B); if the VRS TE or PTE is equal from NIRS TE, the DMU therefore is operating at DRS (point D).

Diagram 3.1. CRS and VRS frontier in DEA
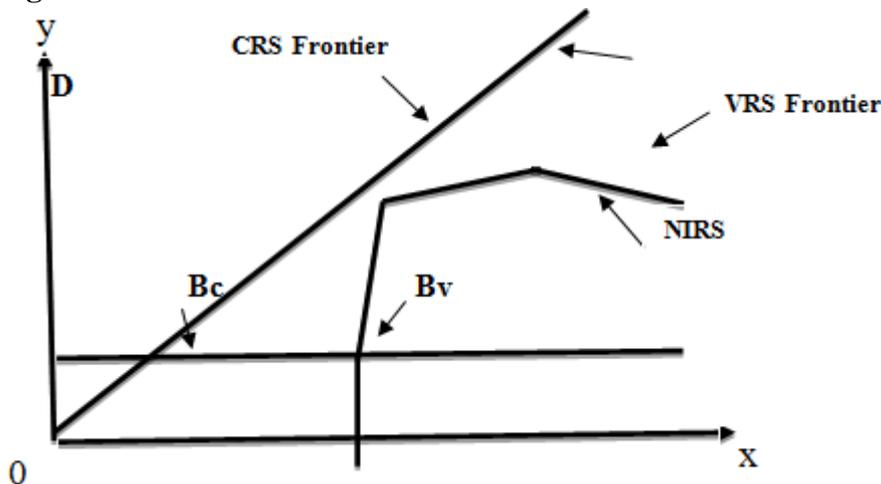
Farell (1957) stated that TE reflects the ability of a firm to obtain maximum output from a given set of inputs. One of the simplest and easiest ways to measure efficiency is:

$$\text{Efficiency} = \frac{output}{input} \qquad (3.1)$$

The DEA developed several approaches in selecting input and output to measure the performance of financial institution namely intermediate and production approaches (Berger, Humphrey, and Humphrey, 1997; Sufian and Kamarudin, 2014; Kamarudin et al., 2018). Kipesha (2012) recommended the production approach with the financial institutions as a production unit to fully utilize capital and labour as inputs to produce outputs of deposits, loans and other financial products (Tsaurkubule, 2017). However, in the intermediate approach, financial institutions act as a financial intermediary by using deposits from surplus clients as input to produce output such as loans and many financial services to fulfill needs of clients in deficit. The deposit plays a different role in each approach; as output in production approach and input in the intermediate approach. Since majority the of MFIs are not collecting, deposit production approach is found to be the most appropriate approach to be included in a DEA analysis (Widiarto and Emrouznejad, 2015; Ghosh,et.al 2017).

To measure the social efficiency of the MFIs, the study includes three input variables namely total assets, operating expenses and personnel expenses. The output variables consist of average loan balance to measure depth of the outreach and number of borrowers to indicate breadth aspect of social outreach. In Table 3.1 below are the details on the input and output variables to measure social efficiency of the MFIs:

Table 3.1: Input and Output Variables for Social Efficiency, (y)
(Kaur, 2016 and Widiarto and Emrouznejad, 2015; and Hassan *et al,* 2012)

Variable	Variable Name	Unit	Description
Input	Assets	USD	Total asset available to MFI from capital and borrowings
	Operating Expenses	USD	Operation expenses including administrative, personnel, depreciation and amortization of MFI
	Personnel Expenses	USD	Salary of staff employed by MFI
Output	Average loan balance	Numeric	Average loan balance per borrower over GNI per capita
	Number of borrowers	Numeric	Number of active borrowers serve by MFIs

Notes: All sources from MIX Market database (www.mixmarket.org)

Second Stage Analysis – Multivariate Panel Regression Analysis

In order to focus the relationship between firm characteristics that impact the level of social efficiency of the MFIs the study employs Multivariate Panel Regression Analysis (MPRA) in the second stages of analysis (Assefa *et al.* 2013 and Vanroose and D'Espallier, 2013). Gujarati (2002) mentioned three kinds of advantages in using MPRA. Firstly, panel data make the data more informative with variability, reduce collinearity among the variables, increase efficiency and give greater degree of freedom to the data. Secondly, panel data can construct better detection and measurement of effects that simply cannot be observed in pure cross-sectional or pure time series data. Thirdly, panel data provides data availablity in several thousand units and this can minimize the bias that might result if individuals or firm level data are divided into broad aggregates.

The estimation methods under MPRA include pooled Ordinary Least Square (OLS), Fixed Effect Model (FEM) and Random Effect Model (REM). According to McDonald (2009), the regression models are estimated by using the White (1980) transformation. It is robust to

heteroskedasticity and the distribution of the disturbances in the regression analysis involving DEA scores as the dependent variable. Nevertheless, before the results are totally based on the pooled OLS estimator method, the Breusch Pagan (BP) and Lagrangian Multiplier (LM) tests need to be executed in order to identify either the data suitable to be panel or pooled data. Thus, if the p-value of the Breusch and Lagrangian Multiplier Chi-Square (X^2) is significant at 5% level, the panel is deemed more appropriate than pooled data.

Gujarati (2002) pointed out the panel data can show several estimation and inference problems. Since such data involve both cross section and time dimensions, problems that plague cross-sectional and time series data (such as heteroskedasticity and autocorrelation) need to be addressed. Some additional problems exist such as cross-correlation in individual units at the same point in time. So, several estimation techniques are used to address one or more of these problems. The two most prominent ones are the FEM and REM. In FEM, the intercept in the regression model is allowed to differ among individuals in recognition of the fact that each individual or cross-sectional unit may have some special characteristics of its own. Meanwhile, REM assumed that the intercept of an individual unit is a random drawing from a much larger population with a constant mean value. If it is assumed that the error component β and X's regressors are uncorrelated, REM may be more suitable, whereas if β and X's are correlated, FEM may be appropriate.

Hausman test can be used to identify between FEM and REM. The null hypothesis underlying the Hausman test is that the FEM and REM estimators do not differ significantly. The test statistics developed by Hausman have an asymptotic Chi-Square (X^2) distribution. If null hypothesis is rejected (at 1% to 5% significant levels only), the FEM may be more appropriate to be used in comparison to the REM however, if a null hypothesis is rejected or is significant at only 10%, the REM is more suitable to be used.

As determined from the microfinance literature, firm characteristic internal factors are found significant to explain the variations of the social efficiency intention. Thus, the study proposed that the size of the operation, age of the operation, financial leverage and profitability as proxies for firm characteristics described the impact on the social efficiency of the MFIs. Table 3.2 below depicts the information on the dependent and independent variables to explain the relationship between firm characteristics and social efficiency of the MFIs.

Table 3.2: Variables of Firm Characteristics of Microfinance Institutions
(Hussain et al. 2018; Wijesiri et al. 2015; Lebovics, Hermes and Hudan, 2014; and Quayes, 2012)

Variable	Description
Dependent	
Social efficiency (*lse*)	The level of social efficiency in DEA
Independent	
Firm Characteristic Variables	
Size of Operation (*lta*)	Total of all net asset account including accumulated depreciation and loan loss reserve
Age of Operation (*lage*)	Number of years operation
Profitability (*lroa*)	Profit is measure by how effective MFI to used their asset to generate profit. Proxy for profitability is return on asset (ROA)
Financial leverage (*lder*)	Weightage of MFI to used equity financing as compared with debt financing to operate their business. Proxy for leverage is debt to equity ratio (DER)

Notes: All sources from World Development Indicator (WDI), World Bank database (www.data.worldbank.org)

Thus, the general model in this study is;

Social Efficiency $_{i,t}$ = $\alpha_{i,t}$ + β($\sum$ Firm Characteristics $_{i,t}$) + η_i + $\mathcal{E}_{i,t}$

$$lse_{i,t} = \alpha_{i,t} + \beta_1 lta_{i,t} + \beta_2 lage_{i,t} + \beta_3 lder_{i,t} + \beta_4 lroa_{i,t} + \varepsilon_{i,t} \qquad (3.2)$$

Where,

lse   = social efficiency of the i-th microfinance in the period t obtained from DEA Model
lta   = size of the operation
lage = age of operation
lder   = debt to equity ratio
lroa   = return on asset

Results and Discussions

In the first stage of analysis, the study provides the summary statistics of outputs and inputs variables in the DEA model. In the following discussion, the study presents the score of social efficiency derived from inputs and outputs via production approach. The analysis

proceeds with para and non-parametric robustness tests. Table 4.1 below summarizes the descriptive statistics of outputs and inputs variable used in DEA model to construct as efficiency frontier in terms of social efficiency of the MFIs. Mean value of number of poor borrowers for the MFIs in ASEAN 5 countries during 2011-2017 is 46,343 and mean value of average loan balance is 0.631. Table 4.1 also revealed the average value of financial revenue equal to USD 7.959 million.

Furthermore, Table 4.1 shows total asset, operating expenses and personnel expenses as three input variables. The average value for total asset is USD 52.200 million; the average value of operating expenses is USD 4.035 million and the average value of personnel expenses is USD 2.220 million. Before proceeding with the discussion regarding the result of social and financial efficiency scores, the study undertakes the test of rule of thumb on the number of input and outputs variables as suggested by Cooper *et al.,* (2002). Since the total number of DMUs in this study, 168 MFIs is more than the number of inputs and outputs variable in social efficiency model, 15(3x 2) and 15(3 x 1), the selection of variables are valid as they comply with the rule of thumb. This validates all the variables in Table 4.1 for the efficiencies of DMUs to be measured.

Table 4.1: Summary Statistics of Output and Input Variables for Social Efficiency of Microfinance Institutions in DEA Model

Variables	Mean	Minimum	Maximum	Standard deviation
Outputs of MFIs				
Social Efficiency				
No of poor borrower	46343.000	109.500	1532695.000	125730.400
Average loan balance	0.631	0.012	17.261	1.281
Inputs of MFIs				
Total assets (in million USD)	52.200	0.005	4720.000	258.000
Operating expense (in million USD)	4.035	0.003	174.000	11.800
Personnel expense (in million USD)	2.220	0.001	105.000	7.097

Note: Input variables are similar for both social and financial efficiency

Table 4.2 below reports the result on the social efficiency scores that were obtained from DEA for MFIs in ASEAN 5 countries. It also displays the score of TE, PTE and SE as a

component of social efficiency. Moreover, the TE implies the overall score of efficiency in the context of social efficiency. The MFIs recorded highest TE at 32.20% in 2014. As implied by the results, the MFIs in ASEAN 5 countries could produce the same amount of outputs by using only 32.20% of the amount of inputs. It shows during 2014, the MFIs have been operating at a relatively optimal scale of efficiency but they have not been operating at managerial efficiency to exploit their resources fully (where, PTIE=61.20% > SIE=17.70%).

The MFI's lowest scores of TE in 2015 at 11.80%. This situation demonstrates the MFIs in ASEAN 5 countries only use 11.80% of the amount of inputs to produce the same amount of outputs. This is due to MFIs not being managerially efficient to fully exploit their resources even though they are operating at the right scale of efficiency (where, PTIE=79.6% > SIE=24.70%).

As a whole, the mean TE for all MFIs in ASEAN 5 countries (Panel H of Table 4.2) is equal to 26.30% with an input waste of 73.70% during the years 2011 to 2017. As explained by the results, the MFIs in ASEAN 5 countries could produce the same amount of outputs by using only 26.30% of the amount of inputs. In other words, amount of inputs wastage of up to 73.70% could be reduced by the MFIs to produce the same amount of outputs. This condition is largely an effect of MFI managerial inefficiency to fully exploit their resources even though they are operating at a right scale of efficiency (where, PTIE=66.10% > SIE=20.30%). To conclude, the results on average TE of 26.30% suggeststhe social efficiency of the MFIs in ASEAN 5 countries from 2011 to 2017 is relatively low overall. Hence, there is much room for improvement specifically in terms of managerial efficiency to fully utilize their resources. Also, the MFIs in ASEAN 5 countries reveal a high standard deviation or dispersion of efficiency as indicated in Table 4.2 below.

Supported *H1*:
Lower and significant social efficiency among the MFIs in ASEAN 5 Countries.

Table 4.2: Summary Statistics of Social Efficiency Score of Microfinance Institutions in ASEAN 5

Efficiency Measures	No. of DMU.	Mean	Minimum	Maximum	Std. Deviation
Panel A: All Firms 2011					
Technical Efficiency	168	0.287	0.035	1.000	0.228
Pure Technical Efficiency	168	0.352	0.054	1.000	0.270

Scale Efficiency	168	0.833	0.406	1.000	0.159
Panel B: All Firms 2012					
Technical Efficiency	168	0.244	0.012	1.000	0.203
Pure Technical Efficiency	168	0.330	0.016	1.000	0.263
Scale Efficiency	168	0.764	0.287	1.000	0.175
Panel C: All Firms 2013					
Technical Efficiency	168	0.281	0.027	1.000	0.217
Pure Technical Efficiency	168	0.357	0.045	1.000	0.259
Scale Efficiency	168	0.800	0.228	1.000	0.174
Panel D: All Firms 2014					
Technical Efficiency	168	0.322	0.030	1.000	0.232
Pure Technical Efficiency	168	0.388	0.050	1.000	0.256
Scale Efficiency	168	0.823	0.381	1.000	0.179
Panel E: All Firms 2015					
Technical Efficiency	168	0.118	0.001	1.000	0.208
Pure Technical Efficiency	168	0.204	0.001	1.000	0.273
Scale Efficiency	168	0.753	0.002	1.000	0.363
Panel F: All Firms 2016					
Technical Efficiency	168	0.315	0.024	1.000	0.232
Pure Technical Efficiency	168	0.388	0.042	1.000	0.264
Scale Efficiency	168	0.810	0.268	1.000	0.191
Panel G: All Firms 2017					
Technical Efficiency	168	0.273	0.035	1.000	0.217
Pure Technical Efficiency	168	0.351	0.052	1.000	0.264
Scale Efficiency	168	0.794	0.088	1.000	0.182
Panel H: All Years					
Technical Efficiency	1176	0.263	0.001	1.000	0.228
Pure Technical Efficiency	1176	0.339	0.001	1.000	0.270
Scale Efficiency	1176	0.797	0.002	1.000	0.215

Table 4.3 below shows the robustness tests for social efficiency of the MFIs in ASEAN 5 countries. The results from parametric t-test suggest the TE for social efficiency is low since the score is below the average and equal to 50% (where TE = 0.263) and significantly different at 1per cent. Similarly, the PTE and SE for the social efficiency also exhibit a lower mean and are significantly different at 1per cent (where, PTE = 0.339 and SE = 0.797). The results from the parametric t-test are further confirmed by the non-parametric Mann-Whitney and Kruskall-Wallis tests. Briefly, the study concludes the MFIs in ASEAN 5 countries pose lower social efficiency, since the results on efficiency in Table 4.3 below are all significant at 1per cent.

Table 4.3: Robustness Tests for Social Efficiency Scores of Microfinance Institutions in ASEAN-5 Countries (2011-2017)

Test Statistics	Parametric Test		Non-parametric Test			
	t-test		Mann-Whitney Test		Kruskall-Wallis Test	
	$t\ (Prb > t)$		$Z\ (Prb > z)$		$x^2\ (Prb > x^2)$	
	Mean	t	Mean Rank	z	Mean Rank	x^2
Efficiency Measures						
Technical Efficiency	0.263	-49.319***	692.030	-34.598***	692.030	1197.031***
Pure Technical Efficiency	0.339	-42.503***	737.780	-31.341***	737.780	982.241***
Scale Efficiency	0.797	-16.426***	973.270	-14.515***	973.270	210.687***

Notes: ***, **, * indicates significance at the 1%, 5% and 10% levels respectively. Figure in parentheses ( ) are standard error

The second stage of analysis reveals the result on the impact of firm characteristics on the social efficiency of the MFIs. The study undertakes MPRA analysis as an estimation method in order to examine the relationship of firm characteristics as independent variables with the social efficiency of the MFIs. Generally, the study employs the score of social efficiency as a dependent variable measured by using DEA in the first stage of analysis. In the MPRA analysis, first is to determine either the data is appropriate to be pooled or panel, the study employs BP and LM test. As indicated in Table 4.4 below, the panel data is most appropriate to be used since the BP and LM Chi Square (x^2) for the proposed models are significant at

1per cent levels. The study next proceeds to the Hausman test that is employed to select between REM and FEM under GLS regression models. As reported in Table 4.4, the GLS FEM regression models are being selected since the Chi Square (x^2) of the Hausman test is significant at 1per cent levels (Ahmed, Zin & Majid, 2016; Ali & Haseeb, 2019; Haseeb, Abidin, Hye, & Hartani, 2018; Haseeb., 2019; Suryanto, Haseeb, & Hartani, 2018).

Based on the FEM framework, the result indicates size (*lta*) and age (*lage*) of the MFIs present a negative relationship with the social efficiency. This is in contrast with leverage (*lder*) and profitability (*lroa*) that report positive correlation to the social efficiency of the MFIs. These results are all significant at 1 and 5 percent significance level. As suggested by the result, the size of the MFIs is negatively correlated with the social efficiency of the MFIs and indicates that larger (smaller) MFIs tend to experience lower (higher) social efficiency. The MFIs become larger in size when they have been commercialized. This condition not only allows them to offer microloans as previously, but to widen the range of banking products including savings, money transfer, insurance and deposits and thus increase the scale operation of the MFIs. This happens because after the commercialization of the MFIs they are no longer a subsidized dependent industry. They need to generate their own funds to sustain long term operation. In short, we can conclude that as the MFIs become bigger in size, the operation switches to focus more on financial sustainability and the original mission of social efficiency, that is to eradicate poverty, is lost. The findings are consistent with past studies such as Widiarto and Emrouznejad (2015), Assefa *et al.,* (2013), Bassem (2008) and Balkenhol (2007), who showed that the larger a MFIs the slower its social efficiency as compared to smaller MFIs.

With regard to the relationship between age (*lage*) and social efficiency, the coefficient exhibits negative and significant at 1percent level. This signifies an older (younger) MFIs are inclined to experience lower (higher) social efficiency. The results indicate that as the MFIs age, they eventually deviate from the initial focus to serve poor people. As time passes, the majority of the MFIs pay more attention to financial products with the purpose to achieve financial sustainability and financial independence. The age of the operation is also a gauge for managerial competency. As illustrated by the results of the social efficiency score in the first stage analysis, the main sources of inefficiency are caused by lack of managerial efficiency. This validates that the older MFIs with managerial incompetence are the more this contributes to lower social efficiency. The findings are similar to Wijesiri *et al* (2015), Assefa *et al.* (2013) and Hermes and Lensink (2011) who indicate that the older MFIs experience lower social efficiency than the younger MFIs.

Furthermore, the coefficient of leverage (*lder*) has a significant positive relationship suggesting that the higher (lower) leverage of the MFIs lead to higher (lower) social efficiency of the MFIs. This is clarified by the current microfinance industry which is more dependent on debt in their financing structure to produce more loans that will increase the number of poor borrowers. In addition, as the MFIs produce better outreach levels as a result of lending activities, this condition helps in extracting premiums from the loans previously disbursed and supports the flow of fund to the MFIs that could later be used to produce more loans that reach the poor. The result also supports the theory of capital structure proposed by Modigliani and Miller (1958) that suggests increase in debt financing will reduce the cost of capital. In context with the MFIs, increased dependency on debt financing could result in products made with lower cost of capital and could thus be used to produce more loans to the poor. The previous literature by Kar (2012) confirms that higher leverage MFIs produce better social efficiency as compared to lower leverage MFIs.

Lastly, the profitability *(lroa)* of the MFIs is positively related to their social efficiency at 1 percent significant level. This result suggests the MFIs with a greater (lesser) profitability tend to achieve higher (lower) social efficiency. The positive relationship of the profitability to the social efficiency reveals the efficient use of each asset in generating an optimal profit for the MFIs. Although the cost to produce small loans is higher, MFIs show the effectiveness in managing assets to generate more profit therefore, solving high cost in generating small loans. The more profitable MFIs indicate the ability to achieve sustainability. The more sustainable MFIs imply the stability of the MFIs to operate in the long run based on intention to increase the number of poor borrowers that has been served and thus to increase outreach. A previous study by Lebovics et al., (2014) also found there was a positive correlation between profitability and social efficiency of the MFIs.

Supported *H2:*
Firm Characteristics have a significant impact on social efficiency of the Microfinance Institutions among ASEAN 5 countries.

Table 4.4: Multivariate Panel Regression Analysis on Social Efficiency of the Microfinance Institutions

Variables	Estimation Models		
	OLS	**REM**	**FEM**
Constant	2.535***	2.596***	2.034**
	(0.331)	(0.361)	(0.960)
Firm Characteristics			

lta	-0.254***	-0.256***	-0.233***
	(0.018)	(0.020)	(0.061)
lage	-0.071***	-0.078	-0.041***
	(0.057)	(0.062)	(0.122)
lroa	0.008	0.011	0.052**
	(0.035)	(0.037)	(0.056)
lder	-0.152***	-0.152**	0.033**
	(0.056)	(0.061)	(0.084)
R^2	0.174	0.032	0.020
BP & LM x^2	3.240**		
Hausman x^2	12.720**		
Mean VIF	1.100		
No. of Obs.	1176	1176	1176

Notes: ***, **, * indicates significance at the 1%, 5% and 10% levels respectively. Figure in parentheses ( ) are standard error

Conclusions and Recommendations

Microfinance institutions (MFIs) are uniquely characterised by their dual objectives of social and financial goals. The MFIs no longer focus solely on the social goal combine this with the financial goal to ensure provision of continuous operation as well as retaining the social effort of poverty reduction. Due to these dual MFI objectives, this study undertook to determine the credibility of the MFIs to retain the social goal to eradicate poverty by determining the level of social efficiency of the MFIs in this first objective. The study results reveal that for the period 2011 until 2017, the score of social efficiency is low among the MFIs in ASEAN 5 countries. The findings also report there is more input wastage in producing social output of the MFIs. The main source of inefficiency for social efficiency was found to be managerial incompetency to fully exploit available resources. However, the findings prove that all MFIs in ASEAN 5 countries are operating at optimal scale of efficiency

The important issue needs to be the emphasis on the original mission of the MFIs to eradicate poverty however, they only manage to owned lower social efficiency to 26.30%. This situation indicates the MFIs in ASEAN 5 countries failed to eradicate poverty to the maximum level thus brought no significant impact to the poor. In other words, it shows that MFIs in ASEAN 5 countries traded their original mission of poverty reduction to focus more on the production of financial products to increase revenue. This happened after commercialization of the MFIs, when they needed to generate their own funds by offering

banking products in a no longer subsidized industry. Unfortunately, the MFIs in ASEAN 5 countries are found inconsistent to balance the social and financial performance as they tend to focus on achieving financial sustainability for long term viability and while depart from the social effort for poverty eradication.

Secondly, the study proposed to examine the effect of firm characteristics on the social efficiency of the MFIs. The study identifies potential factors that internally (firm characteristics) influence the social efficiency of the MFIs. The identification of the factors that may influence the level of efficiency brings a great consequence to the MFIs so that they can concentrate on the factors that mainly contribute to a lower or higher social efficiency. A closer examination of the findings of the impact of firm characteristics as internal determinants to the social efficiency of the MFIs in ASEAN 5 countries reveals that the relationship of the size (*lta*) of the operation is negatively significant with social efficiency of the MFIs. The larger MFIs contribute lower social efficiency when they tend to concentrate on getting a higher revenue for financial stability. Meanwhile, age (*lage*) of the operations indicate a negative and significant relationship with social efficiency of the MFIs. The older MFIs seems to managerially incompetent to face global challenge with regard to financial risk since the MFIs are now closed related with the financial market.

Hence, any fallout in financial market will gradually affect whole performance of the MFIs. In contrast, the variables of financial leverage (*lder*) imply positive and significant relationship with social efficiency. The result justifies the role of the MFIs nowadays as more aligned to that of banking institutions where there is more reliance on debt financing to produce more revenue and thus ablility to serve a large number of poor borrowers. The higher level of financial leverage improves the aspect of social efficiency of the MFIs. While the variable profitability (*lroa*) of the MFIs shows a significant positive relationship with social and financial efficiency. The outstanding social performance of the MFIs through profitability proves their effectiveness in using and managing assets to generate an optimal profit for the MFIs.

Overall, the study can conclude that the firm characteristics that act as an internal determinant provide significant impact to influence social aspects of the MFI intentions. Basically, due to their financial independence, the MFIs nowadays play a similar role to commercial banks where they are found to rely on financial leverage and efficient use of assets to generate profits to produce more loans and thus improve social efficiency in the MFIs. However, since the MFIs are still new in the banking industry, the study found managerial incompetency in handling banking products and less experience at top management specially to deal with global challenge in the financial markets to reduce the social efficiency score of the MFIs.

There are a few recommendations for future researchers. Firstly, since the MFIs nowadays playa similar role to commercial banks, a comprehensive analysis of the financial aspect would be better to measure the performance of the MFIs as a whole. Secondly, with a growing number of the MFIs in the Muslim population, investigation of the performance of Islamic MFIs could be compared with performance of conventional MFIs.

Acknowledgements

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