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## RESEARCH ARTICLE

# PRODUCTIVITY CHANGE IN MICROFINANCE INSTITUTIONS IN SAARC REGION: A MALMQUIST PRODUCTIVITY INDEX APPROACH

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**ABSTRACT**

**Purpose:** Microfinance Institutions (MFIs) play vital role in developing countries. This study is dedicated to inspect the productivity change in microfinance Institutions (MFIs) in the SAARC region.

**Design/methodology/Approach:** A panel of 85 MFIs with five diamond information status from 2003 to 2011 with annual frequency is investigated in the analysis. The methodology which we adopt is Malmquist index through DEA software.

**Findings:** On average a positive TFP growth of MFIs in the SAARC region is documented except from 2005 to 2006 and 2007 to 2009. The efficiency of these MFIs will be helpful for completion of the financial sector and will improve the overall competence and growth.

**Originality/Value:**

We found many article related to measure the productivity change in different region but there is limited articles and research work related on SARRC region. This study has been carried out to find either Micro finance institutions are working efficiently or not.



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## INTRODUCTION

Microfinance organizations (MFIs) are considered important especially for developing countries. They give a variety of monetary (financial) facilities to the world low income family units and entrepreneur persons. This not only fills the gap in the financial sector but also provide credit access to the ignored segment of society. MFIs two fold objective of welfare and sustainability (Bassem, 2014), which spin around two approaches or paradigms first is institutionist paradigms and other one is welfarist paradigms. The "institutionist paradigm", which encourages MFIs, should generate enough revenue to meet their operating and financial expenses (sustainability) and welfarist paradigm which includes a focus on poverty reduction and depth of outreach along with achieving financial sustainability (Musa A. Olasupo, 2014). In the same context, (Otero, 1998) argues that MFIs need to generate high profit, but at the same time, they are required to balance the social objectives of reaching low-income entrepreneurs with generating an effective return for their investors.

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Microfinance has three types of sources formal institutions such as rural banks and co-operatives, semi-formal institutions, such as nongovernment organizations (NGO, s) and informal sources such as money lenders and shopkeepers. Microfinance provides two types of services "financial services" and "non-financial services". Financial services include saving, microcredit, money transfer, micro insurance etc. Non-financial services include training, counselling, education, health etc. In both type of microfinance the common object is the creation of employment opportunities for the poor people and also indicts decrease poverty. Microfinance has come to be regarded as an important vehicle to reduce the incidence of poverty. An increasing proportion of the poverty in many developing countries needy people receive lone from microfinance institutions (MFI, s). Financial Institutions are organizations that deal with savings, investments, assets, loans, deposits, pensions, salaries etc. Of the people and the issues related to them. Examples of financial institutions working in developing countries are Public Sector Banks, Private banks, development financial institutions (DFI,s), foreign banks, investment banks, micro financial banks, specialized banks and Islamic banks As their name suggests Microfinance banks are financial institutions which extend small amounts of loans and similar other financial services to poor people.

Many significant studies are conducted by different researchers to evaluate the performance of micro finance institutions in different region, in recent years some studies are conducted by (Ahmad A. Q., 2006), (Ahmad T. M., Technical Efficiency of Microfinance Institutions in India- A Stochastic Frontier Approach, 2010), (Anne-Lucie Lafourcade, 2005), (Annim, 2010), (Bassem, 2008), (Baumann, 2005), (Ferdousi, 2013), (Gebremichael B. Z., 2012), (Hidenobu Okudaa, 2014), (Ines Ben Abdelkader, 2014), (Jayamaha, 2009), (Sanchez, 2009), (Kipesha, 2012) etc.

However according to our knowledge very limited literature is available to investigate the productivity change in micro finance insinuation in SARRC countries but as a whole SARRC region we never found any single study so far, so this study is aims to fill this gap by investigating the productivity change in MFI, s of SAARC region during the time period of 2003 to 20011 by applying Malmquist index and aiming that it is valuable contribution to literature in areas of MFIs.

The remaining paper is arranged in following pattern In section 2 the paper puts brief Overview of origin of microfinance industry in SAARC region, Section 3 Literature Review, section 4 Data and methodology, Section 5 presents results and discussions. Finally, Section 6 ends up with conclusions.

## Overview of Origin of Microfinance Industry in SAARC Region

The birth of 'modern' micro-finance in developing countries is said to have occurred in the mid-1970s by Muhammad Yunus, who developed it as a way to get rid of poverty in his home country Bangladesh. In 1983, he Founded Grameen Bank, the first institution which introduced this concept and started to Operate in the micro finance business in the proper sense. The Grameen Bank project, which translates literally as "Village Bank", was born, and today works in over eighty-thousand villages with more than six million borrowers. In 2006 both Yunus and Grameen were awarded the Nobel Peace Prize for their work with the poor. Although there have been many other organizations engaged on offering loans and saving opportunities to needy people before, Grameen Bank is known for successfully implementing the system of group lending. In particular, it has proposed a number of indicators to measure the impact of poverty elimination methods. These consider primarily basic needs similar to the definition of the International Labour Organization in 1976 and the financial situation of the poor. Together, Yunus and Grameen Bank were awarded with Nobel Peace Prize in 2006 for their efforts through Microcredit to create economic and social development from below" (The Norwegian Nobel Committee, 2006).

The idea of micro finance institutions meets the two bottom line concept requirements. They provide access to capital on smallest scales, and ideally act as social businesses realizing economic behaviour improved by social preferences. They enable poor people to engage in productive economic activities and thus contribute to development in low income population but still to measure the performance of MFIs is very critical in order to provide continuous financial and social support to the poor. Despite social goals attempted by the MFIs, the self-sustainability objective is to exit from the permanent subsidies recipient group (Yaron, 1994). This objective can be achieved through good performance practice, critical to ensure nonstop operations of MFIs in providing services.

The performance of MFIs is therefore very critical in order to provide continuous financial and social support to the poor. Despite social goals strived by the MFIs, the self-sustainability objective is key to exit from the permanent subsidies recipient group (Yaron, 1994). This objective can be achieved through good performance practice, critical to ensure continual operations of MFIs in providing services.

## Literature Review

Based on a longitudinal and geographical wide study from 1995-2010 by (Goswami, 2013) Introduce a new conceptual model of performance assessment for MFIs. Eight dimensions of performance (efficiency, productivity, sustainability, social, institutional characteristics, outreach governance and financial) are proposed to be the more holistic view of MFIs performance. (Tahrim, 18 June 2014) Our study will focus two dimensions suggested by (Goswami, 2013) which are productivity and efficiency. Efficiency analysis will provide information specifically related to use of resources and magnitude of wastes while Productivity analysis will provide information specifically relate to a vital performance indicator which help the institutions to restructure its operations by calculating its cost of output. In MFI, s its is calculated in terms of work load of loan officers the ratio, loans per loan officer, also known as loan officer productivity. Credit officers involve field faculty or line officers whose interface with the customer, however not authoritative staff or investigators who move ahead advances without immediate customer contact or communication. This proportion demonstrates the productivity of the MFP's credit officers, higher the degree will lead the more productive the foundation. This paper looks at efficiencies of MFI, s in South Asia. The efficiency refers to the capacity to deliver greatest yield at a given level of input and it is the most effective way to provide small loans to the very poor in microfinance context. The main focus is on cost minimization and income maximization at a given level of operation (double bottom line) and it has a lasting impact on financial sustainability of microfinance institutions. Thus, efficiency can be measured by its productivity (for instance, number of borrowers per staff) and cost management (for instance, cost per borrower) dimensions.

Traditionally, to evaluate the performance of MFI, s there are different accounting ratios which provide information but that is not as much use full because its provide only partial measures of efficiency and remaining partial efficiency may be misleading When we draw conclusions on the overall efficiency of MFIs. Some of Studies that follow ratio analysis to measure the efficiency are (Baumann, 2005), (Farrington, 2000) and (Anne-Lucie Lafourcade, 2005). But on the other way (Begoña Gutiérrez-Nietoa, 2007), (Hong Son Nghiem, 2006), (Bassem, 2008), (Ahmad A. Q., 2006), (Lamberteb, 2003), (Mahmood, 2009), (Niels Hermes, 2008), (Mamiza Haq M. S., 2010), (K.M. Zahidul Islam, 2011), (Ahmad T. M., 2010), (Eric FosuotengAbayie, 2011) have applied frontier efficiency measures either the Data Envelopment Analysis or Stochastic Frontier Analysis.

(Baumann, 2005) Uses borrower per staff and saver per staff to check efficiency level and recommended that in MFI, s high productivity level of the staff help in achieving MFI, s double bottom line objective.

(Farrington, 2000) Identify different accounting variables which reveal efficiency of microfinance institutions. These variables includes, number of loans per loan officer, administrative expense ratio and loan officers to total staff, loan size, lending methodology, portfolio size, source of funds and salary structure as the efficiency drivers and henceforth as the measurements for efficiency of microfinance institutions. By utilizing cost per borrower and cost per saver as a measure of effectiveness (Anne-Lucie Lafourcade, 2005) find that formal micro finance institution have greater efficiency then semi formal MFI,s in African and in formal MFI,s, cooperative MFI,s are the least effective. Also, (Anne-Lucie Lafourcade, 2005) differentiate on the basis of efficiently cost management (cost for every borrower and expense for every saver) Africa is the most beneficial MFI, s region then different areas. (Mamiza Haq M. S., 2009) examine the efficiency of micro financial institution in Africa Asia and Latin America by using production approach and result revile that non-governmental MFI,s are working most efficiently than others to achieve dual objective. On the other way, bank micro finance institutions also outperforming efficiently under intermediate approach .so in financial intermediaries banks have access to the local market. Most probably in future bank also performs as a non-governmental micro finance institution.

(Kipesha, 2012) using both production and intermediation approach. So by status show that NGOs and NBFIs were the best performers in both production and intermediation efficiency and improvement in efficiency depend on reduce their operating cost, increase their revenues to achieve their main objective which is outreach to the poor and low income household. The findings of this study is different from findings in most of efficiency studies in MFIs which report the presence of higher inefficiency in both production and intermediation efficiency.

The findings on production efficiency indicate higher efficiency among MFIs which means that in production of output allocation of inputs are well managed. On the other hand, the observation finds higher efficiency among NGOs and NBFIs as compared to commercial banks, cooperative banks, and community bank contrary to most of the empirical findings which report banks to outperform traditional microfinance institutions. (Ahmad A. Q., 2006) measure the Efficiency and Sustainability of Micro Finance Institutions in South Asia and concluded that When the scale efficiency were superior than the pure efficiency its indicate that most of inefficiencies are either due to improper allocation of input resources or operation at inappropriate scale opposite to most empirical results which indicate that most of inefficiencies in MFIs were technical in nature.(Mamiza Haq M. S., 2010) In same context (Sanchez, 2009) examine micro financial institutions (MFI) technical and scale efficiency and comment that formal MFI, s (bank &credit unions) pure technical in nature. Non-financial MFI,s like non profit organization and non financial institutions the inefficiency is pure technical then scale which indicate that MFI,s are not utilizing their resources efficiently to produce output that means that they are not able to increase their funds, improve their loans and attract more borrower. So with scale efficiency they have to make effort to Improve their pure technical efficiency by utilizing there resources at optimal level.

(Annim, 2010) Focus on MFIs efficiency measure through parametric Stochastic Frontier Analysis (SFA) and nonparametric (DEA) technique instead of production and intermediation approach, there is two main points in this study, first is microfinance scope with respect to financial and operation activities and second is to meet the MFIs objectives which is outreach and sustainability. And result identify element which affect the sustainability of microfinance institutions (Kimando, 2012). (Ahmad A. Q., 2006) Use combination of input and output and result indicate that MFI, s is specialized (technical) in nature which is essential requirement for any micro money related establishment achievement. (Begoña Gutiérrez-Nietoa, 2007) Examine specifications of inputs and outputs. Which revealed that the classical ratio analysis is not efficient like DEA efficiency, by examining the performance and productivity changes of MFBs, the study noticed a steady growth in the operations of the MFBs but there are lots of opportunities for progress? The performance indicators of the MFBs shows that return on assets (ROA) and return on equity (ROE) of the MFIs were beneficial indictor for any MFI but at high interest rates. The Malmquist productivity index showed variation in the technical and technological changes as the MFIs had more distinct changes in their technical productivity changes than their technological productivity changes. It was revealed that the MFBs experienced technological productivity decline. Overall, the MFBs had alternating progress and deterioration all over forms of the constituents of their Total Factor Productivity Changes but had the best tendency in their scale efficiency change.(Musa A. Olasupo, 2014)

(Tahrim, 2013) investigate the efficiency and productivity change of microfinance institutions by data envelopment approach (DEA) with dynamic malmquist productivity index (MPI) and concluded that technological change have strong impact on the productivity change which eventually improve the efficiency.

(Gebremichael B. Z., 2012) Using the malmquist productivity index (MPI) to calculate the productivity of MFI, s and result of study indicated that MFI, s have practiced an augmentation of pure technical efficiency (advancement in management practices) instead of a change in ideal size. So in order to meet double bottom line objective they need to seek a technological advancement.

(Ahmad T. M., Technical Efficiency of Microfinance Institutions in India- A Stochastic Frontier Approach, 2010) Examines the specialized productivity level of microfinance establishments result demonstrates that there few microfinance foundations are working effectively and its show Experience (Age) of the microfinance institution is imperative determinants of effectiveness level yet estimate does not make a difference. Additionally mean proficiency of microfinance establishments are low which demonstrates that microfinance foundations can build their yield by the same measure of inputs and Innovation. Besides come about demonstrates that there is no trade-off in the middle of effectiveness and effort in the event of specimen of microfinance establishments included in the study. It has been observed that huge measure of local variety exist in proficiency level of microfinance institutions. (Siti Nurzahira Che, 2003) Examine the effectiveness of microfinance organization by Using a nonparametric methodology which empowers to recognize technical efficacy along with pure and scale efficiencies. Result shows that the Technical efficiency of the microfinance institutions is moderately higher than the other counterpart. Then again, amid this study pure technical efficiency is lower than the scale efficiency that shows the microfinance institution has been inefficient in controlling their expenses as opposed to working at the wrong scale. However interestingly, a few MFI, s shows unadulterated specialized effectiveness is higher than scale productivity demonstrating that microfinance establishments which are working at the wrong scale of operation instead of delivering beneath the production frontier.

(KABLAN, 2012) Examine the role of MFIs and banks in outreaching, the study make effort to find out that either this change support sustainability or outreach. Social efficiency and financial efficiency of the MFIs are examined through DEA .The evidence shows that sustainability exists and financial efficiency and social efficiency have inverse relation. MFIs which focus on outreach is low efficiency, when one regard as their intermediation role. Development have dual impacts on both efficiency, a negative on social efficiency but a positive on financial efficiency and prudential ratios and accounting standards help MFIs in their intermediation role. (Ines Ben Abdelkader, 2014) Assess the execution of microfinance organizations by applying non parametric DEA methods. The assessed results demonstrate that efficacy level in most of countries decreased during the study period and its indicated that the efficiency level in NGO, s are greater than Nonbank financial institutions NBFIs. As indicated by (Jayamaha, 2009) assess the general proficiency by utilizing Data envelopment analysis (DEA). All of these efficiencies (Technical, Pure Efficiency and Scale Efficiency) are build by diverse models on basis of size as well as location And result conclude that the geographical locations have significant differences in their efficiency. And an interesting face is observed that the efficiency of banks is closely associated with size of the banks. Finally, the findings of this study may convince industry decision makers to set up more inclusive policies for promoting CRBs activities in the financial sector and survival of the institutions.

While contradictory to this statement (Hidenobu Okudaa, 2014) Use operating and the value added approach and Malmquist productivity index technique and make statement that the technical Efficiency was greater in large banks than in small banks. These observations indicate that large banks made better use of operational resources than small banks while examining technical efficiency and productivity of domestic and foreign financial institution. No doubt size of MFI,s have strange impact on efficiency of MFI,s but the fund mobilization capability of financial institutions cant neglect so result shows the efficiency level of domestic institutions was more effective than foreign corresponding institutions. When operational approach is applied which focused on the income earning capacity of institutions which is also major factor on which MFI,s efficiency depend so result shows that there was no major difference in technical efficiency between domestic and foreign institutions. It was also observed that financial institutions suffered a slight drop in total factor productivity FTP during the research time frame in Cambodia. So these result suggested that technical efficiency must b enhance in Cambodian financial institutions to improve their operational capacity of individual institutions, advanced banking technologies and skills. (Lamberteb, 2003) have used stochastic frontier analysis, a parametric technique to measure the Philippines of cooperative rural banks efficiency level. So conclude that governance have great impact on MFI,s efficiency and according to their finding the cooperative rural bank who are working under good governance were more efficient then the other who are facing bad governance.

Similarly, (Ahmad T. M., 2010) applied a stochastic frontier model to measure the productivity level of Indian MFI, s amid period 2005–2008. And found that the efficiency level is not attractive but during study period its shows increasing trend. Further, the study found that age of MFI, s has a positive impact on productivity but size did not really effect.

Moreover (Eric FosuotengAbayie, 2011) use stochastic frontier approach to gauge the economic effectiveness of microfinance organization and reasoned that the main source of inefficiencies in the microfinance division are because of the variety in administration practices and specialized limits (both in training and portfolio quality).Along these lines proposed that experts enhance technical efficiency and firms should try to work broadened funds items to enhance portfolio quality and ensure sustainability; as opposed to depending enormously on subsidies fund from donor agency or on lending credit offices from government agencies and other second tier organization .We additionally require an adaptable approach that will take into account all micro finance foundations to have the capacity to get deposits from clients.

To find out the answer whether there is trade off between outreach to poor people and efficiency of MFI, s? (Niels Hermes, 2008) Use stochastic frontier analysis SFA and concluded that efficiency and outreach of MFI, s are negatively correlate with each other. Furthermore, when we take both of these as a depth to reach measure it is found that more female as borrowers are least effective for MFI, s and they have low average loan balance. So study recommended that efficiency can be increased when MFI,s are stick to least focusing on poor people as well female borrower .but keep in mind that our result not necessarily imply that strong focus on efficiency badly effect the poverty reduction.

In the same way, (Oteng-Abayie, 2011) applied a Cobb–Douglas Stochastic frontier model for Ghana MFIs for the period from2007 to 2010. They found an average economic efficiency of average; And identify some of key significant determinants of economic efficiency which are cost per borrower and age and saving are key indicator of outreach and productivity. (Ahmad A. Q., 2006) use the DEA efficiency analysis and consider 25 MFIs, that is functioning in Pakistan, India and Bangladesh which is part of SAARC region on efficiency scores and result concluded that most of inefficiency is technical in nature so MFI, s related to these three SARRC nation should enhance the managerial expertises and technology utilized as a part of offering service in order to improve their efficiency level. Similarly, (Ferdousi, 2013) Findings exposed that among the three countries, MFIs in Bangladesh are enjoying comparatively greater economies of scale. On the other hand average source of inefficiency was purely technical in nature than to the scale inefficiency for all the countries. Therefore, improved management skills are required in order to ensure the efficiently utilization of available input resources to enhance increased outreach and performance of MFIs. However, size of MFI, s are also vital factor for determination MFIs efficiency. Secondly MFIs return on assets (ROA) should be positive, otherwise it becomes inefficient.

The assessment of effectiveness of MFI, s in the Mediterranean nations (Bassem, Efficiency of Microfinance Institutions in the Mediterranean: An Application of DEA, 2008) utilizing Malmquist productivity index approach. The determination of inputs and output are on the premise of the dual objectives concept of MFIs achieving self-sufficiency by taking care of its expenses and arriving at numerous poor customers (outreach).The result demonstrated that MFIs have encountered mainly an addition of pure technical efficiency (improvement in management practices) Instead of a change in ideal size. Overall, an essential strategic implication for the micro finance industry is that they need to follow an innovative progress in required to meet the double objective of reaching to poor people and financial sustainability. (K.M. Zahidul Islam, 2011) using DEA analysis to examine the efficiency of agricultural microfinance borrowers in rice farming in Bangladesh and concluded that that inefficiency is caused by farm-specific and institutional variables And the result shows that in estimation models technical TE and scale efficiency SE are high then Allocative efficiency AE and economic efficiency EE .so it is suggested that they have to develop some indicative policy guideline to minimize cost to improve their efficiency.

(Mamiza Haq M. S., 2010) By Using both production and intermediate approaches cost efficiency of MFI, s in Africa, Asia and Latin America was examined through DEA analysis. So result shows that under production approach non-governmental institute are more efficient and under intermediate approach banks MFI, s are more efficient and it is possible in long run banks may performing as non-governmental microfinance institution in lone run. (Hong Son Nghiem, 2006) Use both parametric and nonparametric methodology. The usage of the two methodologies prompts comparative assessments/ scores of the MFI, s productivity. (Kipesha, 2012) evaluate the efficiency of microfinance institutions (including banks, NBFIs, NGOs and Cooperatives) which operating in East African countries and result found that East African MFI,s are highly efficient and average efficiency shows positive trend. Furthermore result shows that bank and non bank institutions are working more efficiently then NGO, s and cooperatives. To identify reason behind the failure of the microfinance schemes under poverty alleviation (Khatoon, 2014) make their effort and indicate that low recovery process, high rate of interest, multiple loans and corruption in the government sector was some major Obstacles of microfinance institution .These obstacles automatically lead to low repayment rates, as a result microfinance institutions face losses and the MFI,s that are more dependent on bank as funding source, have to face liquidation crunch when they stop lending money to them but Still there is few private micro finance institutions are running based on the same rate of interest and proper recovery strategies. Indian microfinance market is the most evolved and developed market in the world.

The growth strategy is key factor for any MFI, s success. So the impact of growth strategy on performance of the microfinance sector should be examined to strike the two bottom line concept and create a balance between outreach and poverty alleviation. So result suggested that in initial stage of development intensive growth strategy is more effective in term of cost efficient ether then extensive strategy which involves huge investment in infrastructure as well branch network. This will help us to enhance productivity, efficiency and performance. Although the microfinance sector adopted an extensive growth strategy which indicate improvement in outreach and performance indicator but the negative point is it will raise overall cost per borrower as a result the productivity ratios will drop. The most likely reason for weak financial position of the sector is the wrong and costly growth strategy of over expansion which badly affected the cost and productivity of the sector (Mahmood, 2009). (Marek Hudon, 2011) Examine the subsidies affect on MFI, s efficacy and results recommend that subsides have positive effect on MFI, s productivity, but over-subsidization harmful for MFI, s growth. In sample MFI, s which get subsides they have greater productivity level than the MFI, s that are not subsides.

Furthermore (Balkenhol, 2007) idea that the impact of subsides relies on upon their intensity. On one hand, the subsides play very important role to increase MFI,s efficiency, by providing the liquidity to develop the human and physical infrastructure .This effect dominant at lower levels of subsidy intensity which in turn lend to uphold the "smart subsidies" idea, that take into account the intensity and magnitude of the subsidies. The most notable researches conducted on MFIs and Non-Bank Financial Institutions (NBFIs) productivities are by (Gebremichael B. R., 2007) and (Sufian, 2007) using the Malmquist productivity index approach and suggesting that pure technical efficiency has largely contributed to MFI and NBFI technical efficiency progress.

## Data and Methodology

MFIs in the SAARC region are investigated in the study. In SAARC region most of the countries are developing where the poor is in need of microfinance. Also the idea of microfinance is originated from SAARC region which makes it a more localized concept. So the selection of SAARC region will be sagacious criteria for sample selection. The MFIs level variables are gathered from MIX data base www.mixmarket.org, a nongovernmental association whose objective is to advance the exchange of information on the microfinance sector around the world. This database gathers data on 85 MFI, s working according to international standards from six countries of SAARC. We chose 85 MFI, s with the most elevated amounts of information transparency. The specimen is made out of Afghanistan Bangladesh, India, Nepal, Pakistan and Sri Lanka. It covers six SAARC nations. The most recent information for the selected MFI, s dates from 2003 to 2011.

**The Malmquist productivity index**

In the academic financial literature, there are number of different methods like Fisher index, Tornqvist index and the Malmquist Index are adopt to compute the productivity changes but The Malmquist total factor productivity (TFP) index is commonly used to estimate the productivity change. (Lovell, 1996) Identify that the Malmquist index has three fundamental advantages as compare to the Fischer and Tornqvist index. Firstly, it does not require the institutionist paradigm approach (profit maximization, or the cost minimization, assumption). Secondly, it does not require information to input and output prices. Finally, if the researcher has panel data, it allows the decomposition of productivity changes into two components firstly technical efficiency change or catching up, and secondly technical change or changes in the best practice. Its main disadvantage is it's required to compute the distance functions. However, the Data Envelopment Analysis (DEA) technique can overcome this problem efficiently. Due to following three basic reasons, we have selected the Malmquist productivity index (MPI) to study productivity change in SAARC MFIs. The Malmquist productivity index (MPI) estimate the productivity change of decision making units (MFI, s examined) between two time periods. It can be define as the product of Catch-up and Frontier-shift terms. Catch-up or recovery is related to the degree in which a decision making unit (DMU) improves or worsens efficiency; frontier shift (or innovation) is a term which reflects the change in the efficiency its frontiers between the two time periods (CooperWilliam, 2007).

The Malmquist productivity index has one interesting feature that is disintegrated into technical efficiency change index and a technical change index. Therefore, the MFI's productivity change can be credited to either change in technical Efficiency (whether MFIs are getting closer to the production frontier over time) or change in the technology (whether the production frontier is moving away over time), technological progress in the industry, or both. The Malmquist index also interpreted as an index of total factor productivity. The total factor productivity change (TFP) is the product mix of technical efficiency change and technological change (TC). It considers whether firms are endeavouring exertions for productive use of resources to create products and services and whether the current technology has been supplanted with most recent technology for well maintained production. A quality that is more noteworthy than one demonstrate increments in profit, while a value less than one indicates diminishes in productivity over time. Technical efficiency change (TEC) further separation into unadulterated pure technical efficiency (TE) which alludes to the MFI's capacity to dodge squander by producing as much output as input usage permits, or by utilizing as limited input for maximum output generation and scale efficiency change (SE) which alludes to the MFI's capacity to work at its ideal scale with respect to the frontier. The Malmquist productivity index was engaged in to quantify the productivity change of MFI,s between two data point by computing the proportion of the distances of every data point relative toward a typical technology of one time period with the technology of an alternate time period by blending inputs and output of both time period.

**Selection of Input and Output**

The basic role of the production function is to clarify the maximum amount of output firm can deliver from by use a defined set of inputs efficiently and other applicable variables that may clarify the amount of output produced. In the literature of MFI, s efficiency, researchers view as three broad methodologies which are intermediation, production and assets approach. The first one methodology is intermediation approach which considers budgetary institution as intermediaries of funds between contributors (depositors) and financial specialists(investors).Under attention this methodology, deposits are viewed as inputs since they contain the raw material to be changed into lone and investible funds (Ashton, 1998), (Günter Lang, 1996) (Lindley, 1977). The second one is the production approach which considers finance related institution as producers of loans and provider of services for account holders. Therefore, deposit to be considered as output in light of the fact that they include the formation of value added associated with liquidity, safekeeping and instalment services provided to investor (Benston, 1982), (Hunter, 1986). At long last third approach is the assets approach it is expected that the essential reason for any financial related institution is the creation of loan (advance). Also here the estimate of financial institutions acts as output in this methodology. Emulating (Fare, 1994), embraced the output oriented Malmquist productivity change index, which underscore on the equi-proportionate increment of output, inside the framework of a given level of input. This choice can be legitimate to the fact that the MFI,s basic purpose is to increasing outreach i.e. providing credit to the poor people which adequate with not only their social mission but also contributes towards sustainability as well by collecting more revenues from lending, collectively prop up to the duel objective. In addition to that they take up an imperfect economic environment as the markets for MFIs are not as well developed as the conventional banking sector. And they always have restricted amount of money and human resource (inputs) to spend on unlike commercial banks which can generate money from shareholders (Ahmad N. , 2010). The selection of specifications with correct inputs and outputs in the context of MFIs is critical. Based on the literature (Begoña Gutiérrez-Nietoa, 2007) and (Bassem, 2014)pattern is followed.

## RESULTS AND DISCUSSION

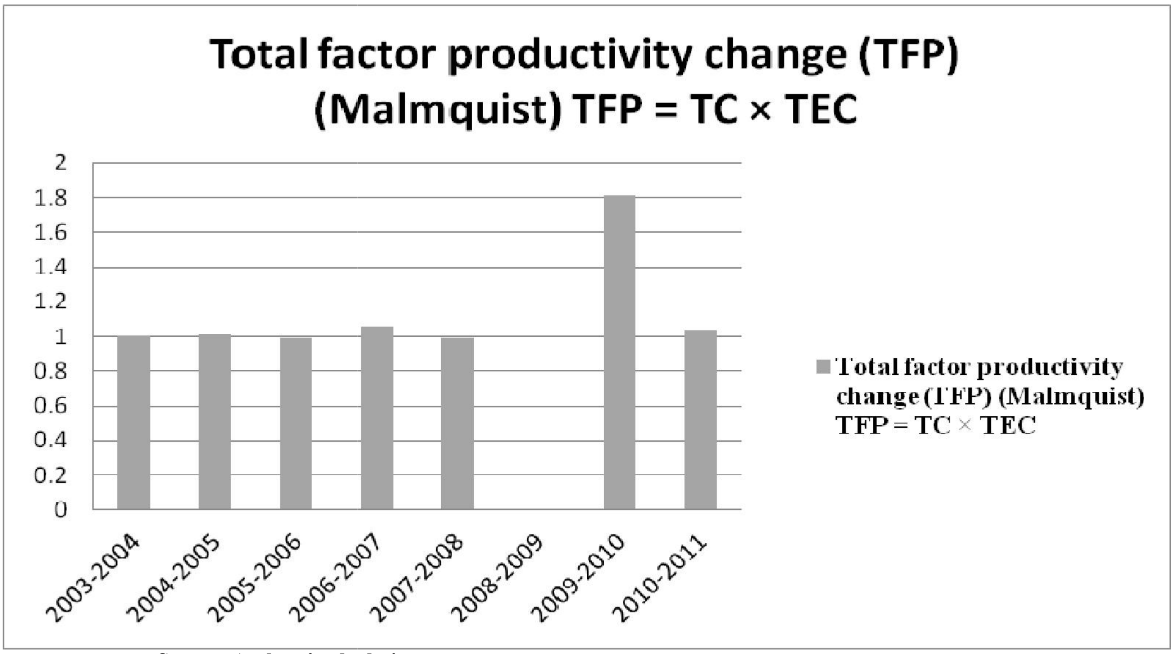
By following (Fare, 1994) the Malmquist total factor of productivity (FTP) change index has been calculated. The basic rule that is followed for evaluation is if the total factor of productivity index is more than one it means micro finance institution are working efficiently But if the value of TFP is less than one that means efficiency is declining during the study period. When we are talking about the productivity its is product of technical efficiency and technological efficiency which express as TFP = TC × TEC. Technical efficiency means that how efficiently an input are transformed into output without waste and technological efficiency change means and its is split into two component scale efficiency change (SE) and pure efficiency change (TE) expressed as TEC = TE × SE and its tell us the overall productivity change in the microfinance industry of the SAARC countries.

furthermore, table of malmquist index summary of firm means result demonstrate that 65 out of 85 MFI,s ( around 76%) has indicated change in specialized productivity changes. interestingly, just 21 out of 85(25%) MFI,s have indicated change in innovative (technological) change and study recommended that there has been a decline in the execution of the best rehearsing micro fund organizations and overall only 45 out of 85 microfinance institutions shows positive total factor of productivity index (TFP) growth. Now If the technical efficiency change is decompose into pure technical efficiency and scale efficiency result illustrate that during study time frame, pure technical efficiency increased by 0.7% while scale

**Table 1. Malmquist Index Summary of Annual Means**

| Years | Technical efficiency change TEC = TE × SE | Technological change (TC) | Pure technical efficiency Change TE) | Scale efficiency change (SE) | Total factor productivity change TFP = TC × TEC |
|---|---|---|---|---|---|
| 2003-2004 | 1.046 | 0.962 | 0.915 | 1.143 | 1.006 |
| 2004-2005 | 1.134 | 0.891 | 1.194 | 0.950 | 1.010 |
| 2005-2006 | 1.120 | 0.886 | 1.056 | 1.060 | 0.992 |
| 2006-2007 | 0.815 | 1.303 | 0.876 | 0.930 | 1.062 |
| 2007-2008 | 1.103 | 0.900 | 1.107 | 0.996 | 0.992 |
| 2008-2009 | 0.794 | 0.000 | 0.861 | 0.922 | 0.000 |
| 2009-2010 | 1.278423 | 1.809 | 1.195 | 1.069423 | 1.809 |
| 2010-2011 | 1.125 | 0.922 | 1.111 | 1.013 | 1.038 |
| Mean | 1.039 | 0.000 | 1.031 | 1.008 | 0.000 |

**Source: Authors' calculations**




**Source: Authors' calculations**

**Fig.1. Total Factor of Productivity**

The Table 1 and Figure 1 of Malmquist Index Summary Of Annual Means and chart of TFP shows that overall, microfinance industry has reported general productivity regress during the study period despite the fact that all the SAARC MFI,s have positive TFP development except for the year 2005-2006,2007-2008,2008– 2009. Furthermore, the result shows that the average technical efficiency annual rate is 3.9% while there is alarming indication for technological change so attention is required.

efficiency Contributed on average 0.11% increase and subsequently recommended that amid the study period the SAARC MFI, s have encountered predominantly an augmentation of pure technical efficiency improvement in management practices) instead of change in optimum size (scale efficiency change).

**Table 2. Malmquist Index Summary of Firm Means**

| Firms | Technical efficiency change TEC = TE × SE | Technological change (TC) | Pure technical Efficiency Change (TE) | Scale efficiency change (SE) | Total factor productivity change (Malmquist) TFP = TC × TEC |
|---|---|---|---|---|---|
| 1 | 0.986 | 0.908 | 1.000 | 0.986 | 0.895 |
| 2 | 0.866 | 0.971 | 0.834 | 1.038 | 0.840 |
| 3 | 1.084 | 0.926 | 1.119 | 0.969 | 1.004 |
| 4 | 1.019 | 0.943 | 1.048 | 0.972 | 0.961 |
| 5 | 1.087 | 0.929 | 1.096 | 0.992 | 1.011 |
| 6 | 1.042 | 0.923 | 1.045 | 0.996 | 0.962 |
| 7 | 1.019 | 0..919 | 1.007 | 1.011 | 0.936 |
| 8 | 1.114 | 1.040 | 1.164 | 0.957 | 1.158 |
| 9 | 1.055 | 0.969 | 1.054 | 1.001 | 1.022 |
| 10 | 1.075 | 1.012 | 0.991 | 1.085 | 1.089 |
| 11 | 0.992 | 1.014 | 1.000 | 0.992 | 1.006 |
| 12 | 1.069 | 0.966 | 1.100 | 0.972 | 1.033 |
| 13 | 1.037 | 0.884 | 1.034 | 1.003 | 0.917 |
| 14 | 1.059 | 0.926 | 1.076 | 0.984 | 0.981 |
| 15 | 0.840 | 0.920 | 0.908 | 0.926 | 0.773 |
| 16 | 1.083 | 0.943 | 1.051 | 1.031 | 1.022 |
| 17 | 1.026 | 1.004 | 1.008 | 1.017 | 1.030 |
| 18 | 0.945 | 0.988 | 0.942 | 1.003 | 0.934 |
| 19 | 0.994 | 0.915 | 0.925 | 1.075 | 0.910 |
| 20 | 1.105 | 0.963 | 1.172 | 0.943 | 1.064 |
| 21 | 1.187 | 1.019 | 1.228 | 0.967 | 1.210 |
| 22 | 1.016 | 1.015 | 1.000 | 1.016 | 1.032 |
| 23 | 1.049 | 0.989 | 0.999 | 1.050 | 1.038 |
| 24 | 1.076 | 0.996 | 1.146 | 0.938 | 1.072 |
| 25 | 0.927 | 0.968 | 0.919 | 1.009 | 0.897 |
| 26 | 1.041 | 0.989 | 0.991 | 1.051 | 1.030 |
| 27 | 0.986 | 1.022 | 0.954 | 1.033 | 1.007 |
| 28 | 1.055 | 0.901 | 1.060 | 0.996 | 0.951 |
| 29 | 0.993 | 0.965 | 0.906 | 1.029 | 0.900 |
| 30 | 0.982 | 0.965 | 0.967 | 1.015 | 0.947 |
| 31 | 1.022 | 0.941 | 1.012 | 1.010 | 0.962 |
| 32 | 0.991 | 0.945 | 0.984 | 1.007 | 0.936 |
| 33 | 1.114 | 1.035 | 1.060 | 1.051 | 1.153 |
| 34 | 0.975 | 0.999 | 0.961 | 1.014 | 0.974 |
| 35 | 0.978 | 0.965 | 0.979 | 1.000 | 0.944 |
| 36 | 1.078 | 0.959 | 1.092 | 0.987 | 1.034 |
| 37 | 1.000 | 0.964 | 1.000 | 1.000 | 0.964 |
| 38 | 1.034 | 0.963 | 1.103 | 0.938 | 0.996 |
| 39 | 1.075 | 1.001 | 1.111 | 0.968 | 1.077 |
| 40 | 1.159 | 1.025 | 1.110 | 1.044 | 1.188 |
| 41 | 1.041 | 0.949 | 1.000 | 1.041 | 0.989 |
| 42 | 1.128 | 1.008 | 1.215 | 0.928 | 1.137 |
| 43 | 1.033 | 0.987 | 1.029 | 1.003 | 1.020 |
| 44 | 0.973 | 0.991 | 1.001 | 0.972 | 0.964 |
| 45 | 1.008 | 0.910 | 1.004 | 1.005 | 0.917 |
| 46 | 1.046 | 0.967 | 1.026 | 1.020 | 1.012 |
| 47 | 1.077 | 1.027 | 1.111 | 0.969 | 1.105 |
| 48 | 1.105 | 0.970 | 1.121 | 0.986 | 1.072 |
| 49 | 1.000 | 0.915 | 1.000 | 1.000 | 0.915 |
| 50 | 1.012 | 0.999 | 0.995 | 1.016 | 1.010 |
| 51 | 1.109 | 0.949 | 1.000 | 1.109 | 1.053 |
| 52 | 0.987 | 0.954 | 0.983 | 1.005 | 0.942 |
| 53 | 1.103 | 0.980 | 1.122 | 0.983 | 1.080 |
| 54 | 1.110 | 1.017 | 1.112 | 0.998 | 1.129 |
| 55 | 1.010 | 0.911 | 1.014 | 0.997 | 0.920 |
| 56 | 1.046 | 0.991 | 1.040 | 1.005 | 1.036 |
| 57 | 1.043 | 0.995 | 1.069 | 0.976 | 1.037 |
| 58 | 0.998 | 0.923 | 0.968 | 1.031 | 0.921 |
| 59 | 1.003 | 1.017 | 0.978 | 1.026 | 1.019 |
| 60 | 1.042 | 0.969 | 1.000 | 1.042 | 1.009 |
| 61 | 1.028 | NaN | 1.050 | 0.979 | NaN |
| 62 | 1.091 | 0.964 | 1.018 | 1.072 | 1.053 |
| 63 | 1.023 | 0.935 | 1.014 | 1.008 | 0.956 |
| 64 | 1.043 | 1.008 | 1.064 | 0.980 | 1.051 |
| 65 | 1.046 | 0.978 | 1.070 | 0.978 | 1.023 |
| 66 | 1.020 | 1.013 | 1.000 | 1.020 | 1.033 |
| 67 | 1.433 | 1.036 | 1.419 | 1.010 | 1.485 |
| 68 | 1.013 | 0.974 | 1.000 | 1.012 | 0.986 |
| 69 | 1.147 | 1.011 | 1.156 | 0.992 | 1.160 |
| 70 | 0.987 | 0.949 | 1.038 | 0.951 | 0.937 |
| 71 | 1.026 | 1.003 | 0.997 | 1.029 | 1.029 |
| 72 | 1.030 | 0.956 | 1.027 | 1.003 | 0.984 |
| 73 | 1.105 | 0.965 | 1.073 | 1.030 | 1.066 |
| 74 | 0.952 | 0.962 | 0.939 | 1.014 | 0.916 |
| 75 | 1.089 | 0.976 | 0.971 | 1.121 | 1.062 |
| 76 | 0.962 | 0.940 | 0.960 | 1.002 | 0.904 |
| 77 | 1.003 | 0.974 | 0.974 | 1.030 | 0.977 |
| 78 | 0.991 | 0.900 | 0.964 | 1.027 | 0.891 |
| 79 | 1.151 | 0.947 | 1.100 | 1.046 | 1.090 |
| 80 | 1.067 | 1.001 | 1.039 | 1.026 | 1.067 |
| 81 | 1.044 | 0.953 | 1.038 | 1.005 | 0.995 |
| 82 | 1.018 | 0.952 | 0.893 | 1.140 | 0.969 |
| 83 | 1.098 | 0.988 | 1.080 | 1.017 | 1.085 |
| 84 | 1.022 | 1.013 | 0.982 | 1.041 | 1.035 |
| 85 | 1.044 | 0.947 | 1.032 | 1.012 | 0.989 |
| Mean | 1.039 | NaN | 1.031 | 1.008 | NaN |
| | 65/85 | 21/85 | 59/85 | 55/85 | 45/85 |

Source: Authors' calculations

**Conclusion**

The present study was conducted to examine productivity change in south Asian MFIs over the period of 2003–2011 using the Malmquist productivity index and a balanced panel dataset of 198 observations from 85MFIs. The selection of inputs and outputs is selected according to the dual objectives of MFIs: achieving self-sufficiency by covering its costs and reaching many poor clients (outreach). Therefore, we specify number of employees, and operating expenses as inputs and gross loan portfolio and as number of loans outstanding. The exact discoveries of the study demonstrate that the microfinance business has reported general productivity regress in the study period despite the fact that all the SAARC MFI,s have positive TFP development except for the year 2005-2006,2007-2008,2008– 2009.

Furthermore, our study indicates that the main wellspring of total factor of productivity TFP development for the MFI,s was ascribed to the technical efficiency change (3.9 percent increment) as the result demonstrate that 65 out of 85 MFI,s (around 76%) has indicated change in specialized productivity changes. Interestingly, just 21 out of 85(25%) MFI, s has indicated change in innovative (technological) change and study recommended that there has been a Decline in the execution of the best rehearsing micro fund organizations. furthermore the result demonstrated that pure technical efficiency by 3.1 percent while scale effectiveness helped generally 0.8 percent expansion and subsequently recommended that amid the study period the SAARC MFI,s have encountered mostly an augmentation of unadulterated specialized productivity (change in administration hones) instead of a change in ideal size (scale productivity change). For the most part, a paramount ramification for the SAARC micro money industry is that they have to seek after a mechanical advancement to meet the double bottom line objective of reaching many poor people and budgetary maintainable quality.

Our discovery lends solid backing to past studies directed by(Geeta Krishnasamy, 2004), (Sufian, 2007), (Bassem, 2014), (Hidenobu Okudaa, 2014), (Musa A. Olasupo, 2014) and (Bereket Zerai Gebremichael, 2012) purposing that Generally, a vital implication for the SAARC micro finance industry is that they have to increase technological progress to meet the dual objectives of reaching many poor people which is welfarist side and financial sustainability which is survival of any MFI,s.

**ABBREVIATIONS**

**TEC-** Technical Efficiency Change
**TC-**Technological Change
**TE-**Pure Technical Efficiency Change
**SE-**Scale Efficiency Change
**MPI-** Malmquist Productivity Index
**SARRC-**South Asian Association for Regional Cooperation
**AE-** Allocative Efficiency
**CRS-** Constant Returns To Scale
**DEA-** Data Envelopment Analysis
**DRS-** Decreasing Returns to Scale
**EE-** Economic Efficiency
**IRS-** Increasing Returns to Scale
**MFI -**Microfinance Institution
**NGO-** Non-Governmental Organisation
**SFA-** Stochastic Frontier Analysis
**TFP-**Total Factor of Productivity Index
**UNDP-** United Nations Development Program
**VRS-** Variable Returns To Scale
**DFI -**Development Financial Institutions
**NBFI-**Non-Bank Financial Institutions

## REFERENCES

Ahmad, A. Q. 2006. Efficiency and Sustainability of Micro Finance. Pakistan Institute of Development Economics (PIDE), 1-37.

Ahmad, N. 2010. Efficiency and productivity of microfinance: incorporating the role of subsidies. Retrieved from https://dipot.ulb.ac.be/dspace/bitstream/2013/56753/1/RePEc_sol_wpaper_10-009.pdf.

Ahmad, T. M. 2010. Munich Personal RePEc Archive, 1-21.

Ahmad, T. M. 2010. Technical Efficiency of Microfinance Institutions in India- A Stochastic Frontier Approach. 1-21.

Anne-Lucie Lafourcade, J. I. 2005. Overview of the Outreach and Financial Performance of Microfinance Institutions in Africa. 1-22.

Anne-Lucie Lafourcade, J. I. 2005. Overview of the Outreach and Financial Performance of Microfinance Institutions in Africa. 1-20.

Annim, S. K. 2010. Microfinance efficiency trade-offs and complementarities. 1-32.

Ashton, J. 1998. Technical change in the UK retail banking sector: 1984-1995. Applied Economics Letters, 5, 737-740.

Balkenhol, 2007. Microfinance and public policy. Outreach, performance and efficiency. Palgrave Edition.

Bassem, B. S. 2008. Efficiency of Microfinance Institutions in the Mediterranean: An Application of DEA. 343-352.

Bassem, B. S. 2014. Total factor productivity change of MENA microfinance institutions A Malmquist productivity index approach. ScienceDirect Economic Modelling, 1-8.

Baumann, T. 2005. Pro poor microcredit in South Africa: cost efficiency and productivity, 95-118.

Begoña Gutiérrez-Nietoa, C.S.C. 2007. Microfinance institutions and efficiency. Elsevier, 131-142.

Benston, G. H. 1982. Scale economies in banking: a restructuring and reassessment. *J. Money Credit Bank*, 4, 435-456.

Bereket Zerai Gebremichael, D. L. 2012. Total factor productivity change of ethiopian Microfinance Institutions (MFIs): A Malmquist Productivity Index Approach. European Journal of Business and Management, 105-114.

CooperWilliam, W. S. 2007. Data Envelopment Analysis A Comprehensive Text with Models, Applications, References and DEA-Solver Software.Springer, New York.

Eric FosuotengAbayie, K. A. 2011. The Measurement and Determinants of Economic Efficiency of Microfinance Institutions in Ghana: A Stochastic Frontier Approach. African Review of Economics and Finance, 2, 149-166.

Fare, R. G. 1994. Productivity growth, technical progress, and efficiency change in industrialized countries. *American Economic Review*, 66-83.

Farrington, 2000. Efficiency in microfinance institutes. Micro Bank. Bull. 8-23.

Ferdousi, F. 2013. Performance of Microfinance Institutions in Asia DEA based efficiency analysis. 91-94.

Gebremichael, B. R. 2007. Total factor productivity change of ethiopian microfinance institutions (MFIs): a malmquist productivity index approach (MPI). *Elsevier Science*, 105-114.

Gebremichael, B. Z. 2012. Total Factor Productivity Change of Ethiopian Microfinance. *European Journal of Business and Management*, 1-11.

Geeta Krishnasamy, A. H. 2004. Malaysian post-merger banks' productivity:application of Malmquist productivity index. *Managerial Finance*, 30, 63-74.

Goswami, R. 2013. A scientometric analysis of literature on performance assessment of microfinance institutions (1995-2010). *International Journal of Commerce and Management*, 148-174.

Günter Lang, P. W. 1996. Efficiency and technical progress in banking Empirical results for a panel of German cooperative banks. *Journal of Banking & Finance*, 1003–1023.

Hidenobu Okudaa, C. P. 2014. Operational Efficiency and TFP Change of Major Cambodian Financial Institutions. 1-22.

Hong Son Nghiem, T. C. 2006. The efficiency of microfinance in Vietnam: Evidence from NGO schemes in the north and the central regions. *International Journal of Environmental, Cultural, Economic and Social Sustainability*, 71-78.

Hunter, W. T. 1986. Technical change, organizational form, and the structure of bank production. *J. Money Credit Bank*, 18, 152–166.

Ines Ben Abdelkader, S. H. 2014. Microfinance Institutions' Efficiency in the MENA Region: *Research Journal of Finance and Accounting*, 1-13.

Jayamaha, A. 2009. Efficiency of Small Financial Institutions in Sri Lanka. *Journal of Emerging Trends in Economics and Management Sciences*, 1-12.

K.M. Zahidul Islam, S. B. 2011. Technical, Economic and Allocative Efficiency of Microfinance Borrowers and Non-Borrowers: Evidence from Peasant. *European Journal of Social Sciences*, 361-377.

Kablan, S. 2012. Microfinance efficiency in the West African Economic and Monetary Union:have reforms promoted sustainability or outreach? Munich Personal RePEc Archive, 1-32.

Khatoon, D. N. 2014. Financial inclusion- how effective is micro finance? Abhinav International Monthly Refereed *Journal of Research in Management & Technology*, 38-42.

Kimando, K. N. 2012. Factors Influencing the Sustainability of Micro-Finance Institutions in Murang'a Municipality. *International Journal of Business and Commerce*, 21-45.

Kipesha, E. F. 2012. Efficiency of Microfinance Institutions in East Africa: A Data Envelopment Analysis. *European Journal of Business and Management*, 1-12.

Kipesha, E. F. 2012. Efficiency of Microfinance Institutions in East Africa: A Data Envelopment Analysis. *European Journal of Business and Management*, 1-12.

Lamberteb, M. D. 2003. Efficiency and expense preference behavior in Philippines' cooperative rural banks. 3-21.

Lindley, C. W. 1977. Inputs, outputs and a theory of production and cost at DEPOSITORY FINANCIAL INSTITUTIONS. *The Journal of Finance*, 32, 1251–1266.

Lovell, G.-T. A. 1996. Deregulation and productivity decline: the case of Spanish savings banks. European Economic Review, 40, 1281-1303.

Mahmood, S. A. 2009. Growth and performance of microfinance in Pakistan. Pakistan Economic and Social Review, 99-122.

Mamiza Haq, M. S. 2009. Efficiency of Microfinance Institutions: A Data Envelopment Analysis. *Asia-Pacific Financial Markets*, 1-13.

Mamiza Haq, M. S. 2010. Efficiency of Microfinance Institutions: A Data Envelopment Analysis. *Pakistan Institute of Development Economics* (PIDE), 1-13.

Marek Hudon, D. T. 2011. On the Efficiency Effects of Subsidies in Microfinance: An Empirical Inquiry. *World Development*, 39, 966–973.

Musa A. Olasupo, C. A. 2014. Performance and productivity changes of microfinance banks in south-west, Nigeria. *International Journal for Innovation Education and Research*, 43-51.

Niels Hermes, R. L. 2008. Outreach and Efficiency of Microfinance Institutions. 1-29.

Oteng-Abayie, E. A. 2011. The measurement and determinants of economic efficiency of microfinance institutions in Ghana: a stochastic frontier approach. *Elsevier Science*, 1-18.

Otero, M. 1998. Types of owners for microfinance institutions. Ownership, Competition and Control of Microfinance.

Sanchez, M. K. 2009. Efficiency Analysis of Microfinance Institutions in Developing Countries. 1-22.

Siti Nurzahira Che, T. A. 2003. Efficiency Analysis of Microfinance Institutions in ASEAN: A DEA Approach. Business Management Dynamics, 13-23.

Sufian, F. 2007. Total factor productivity change in non-bank financial institutions: Evidence from Malaysia applying a malmquist productivity index (MPI). *Elsevier Science,* 177-186.

Tahrim, I. M. 18 June 2014. Efficiency and Productivity Analysis of Microfinance Institutions in Cambodia: A DEA Approach. *Proceedings of Eurasia Business Research Conference*, 1-20.

Tahrim, I. M. 2013. Efficiency Analysis of Microfinance Institutions in ASEAN: A DEA Approach. *Business Management Dynamics*, 13-23.

Yaron, J. 1994. What Makes Rural Finance Institutions Successful? *The World Bank Research Observer*, 9, 49-70.

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