



Efficiency of Microfinance providers in Pakistan: An Empirical Investigation

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ABSTRACT

Purpose: The aim of this study is to assess the efficiency of microfinance institutions in Pakistan using quarterly data from microfinance connect of second quarter of 2006 and second quarter of 2016 for comparison of two different time span. To estimate efficiency of microfinance institutions in Pakistan, the Data Envelopment Analysis are employee. Out of 52 microfinance providers in Pakistan, only 15 microfinance institutions is sample across the industry based on profile of gross loan portfolio of each microfinance provider. to estimate the efficiency of microfinance providers in Pakistan (i.e. constant returns to scale, variable returns to scale and scale efficiency), Malmquist productivity Index and total factor productivity of the microfinance institutions, two input variables (loan amount disbursed, total staff) and output variables (gross loan portfolio and number of active borrowers) are used. The results of the study conclude that MFIs in Pakistan are working below their optimum scales measurements and only one microfinance provider (Khushali Bank) out of 15 in our sample in 2007 and (Thardeep rural support program) in 2016 works on efficient frontier and while others are inefficient. It recommended that the institutions should increase loan amount disbursed and invest resources to the train their staff. Moreover, microfinance providers should expand by increasing number of offices to assist community.

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1. Introduction

Microfinance consolidation refers to the supply of loans and other financial services, such as savings, insurance to the poor. Due to the collateral needs of the banks, where services are not obtained from commercial banks to poor and the poor are willing to pay but they do not have anything to mortgage. The term also describes the sustainability of the provision of such services. More broadly, we can say that this service is very helpful for poor and near poor families because they Access to high-quality financial services, not just credit but also money transfer, savings and insurance (Christen, RP, Rosenberg, R and

Jayadeva, V., 2004).

The main equity of microfinance companies is to improve access to financial services for the poor because Poverty in Pakistan is increasing day by day. Most of the people live below the poverty line and they need credit. Credit is the pillar of the microfinance industry. The rural support program account has increased by about 44% of microcredit where Credit agencies and banks accounted for 22% and 31% correspondingly. In the second quarter of 2016, the number of active borrowers in Pakistan was more than 4.1 million for the first time in the history of microfinance industry of Pakistan, which gradually increased from 2010.

In Pakistan, microfinance industries contain 10 “microfinance banks”, 16 “microfinance institutions”, including eight “rural support programs”, 19 “non-governmental organizations” and two “commercial financial institutions” (Micro Watch2016).

2. Literature Review

Different studies have conducted on different aspects of microfinance, such barriers to microfinance outreach, the emergence of microcredit, indicators of microfinance performance, effectiveness of microfinance and microfinance regulatory frameworks. However, this study focused on the analysis microfinance efficiency in Pakistan. The following reviews of the different studies presented to explore the work done in the area of microfinance.

Hartarska and Nadolnyak (2007) explored the collision on microfinance institution's efficiency by using data of 114 microfinance institutions from sixty-two countries by collected cross-country data from Mix market. It analyzed the efficiency itemized of specific MFI's such as macro-economic variables. Descriptive statistics measured the outreach and random effect model was used for empirically estimation on panel data. The results suggested that supervisory participation was not affected by the sustainability as much as outreach of the institutions, which have better capital condition have better sustainability.

Akhtar and Jaffri (2009) explored that most appropriate poverty alleviation based on Islamic Microfinance Institutions in Pakistan. Furthermore, conventional microfinance institutions was successors in Muslim countries but these are not accomplished the wants of overall Muslim clients in Pakistan. They used the data of the previous 5 years of Akhuwat (an Islamic microfinance institute in Pakistan). This study based on case study of Akhuwat, which distribute the charitable loans of interest free. The Islamic microfinance encourage, uplift the standard of living of the people, conversely increase economic development, and increase the richness of any country.

Rauf and Mehmood (2009) investigated the impact of microfinance sector on the performance in Pakistan. Using the panel data from 2004 to 2007by including 1165 branches and 9539 workers working in microfinance industry Measured the outreach with the help of six dimensions i.e Depth of the outreach, Breath of outreach, Possibility of outreach, Value or cost of Financial service and operational sufficiency or cost outreach. The results showed that if the microfinance institutions increase their efficiency and outreach then they must adopt massive development technique and showed progress in the context of different indicators.

Ahmad (2011) estimated the efficiency of MFI's (Microfinance Institutions) in Pakistan. In the study data of 2007 and 2009 was used. “Data Envelopment analysis DEA a non-parametric technique” was used in this study with the context of earnings to balance technology underneath the basis of sustainability. In and out, (input and output strategy) oriented model was used in study. The results suggested that increase the technology and improvement managerial skills decrease the inefficiency. Specific trainings should be arranged for the staff so for as for clients in the microfinance industry of Pakistan.

Abayie et al (2011) empirically investigated the economic efficiency of MFI's (Microfinance institutions)

in Ghana data of 135 Microfinance institutions was used as sample for the duration of three years (2007-2010). Cobb-Douglas Stochastic model was used to calculate the efficiency under the assumption the firms fully utilize their savings and gave better quality services to their clients. The results showed that for the sake of increase the customer confidence the institute should give good and better quality services to their clients with more influence to increase their existent and business. The main reason of inefficiency in Ghana was disparity in management differences and practice in technical capacities. So to overcome this increase training programs.

Hermes et al (2011) explored the tradeoff between to the efficiency of MFI's (Microfinance institutions) and the outreach of the poor. Panel data of 4035 microfinance institutions for the year of 1997 to 2007 was collected from MIX Market. Stochastic frontier analysis technique was used to measure the efficiency of microfinance institutions. The result showed that the investors invest for commercialization only but they did not focus on efficiency.

Ana & Sefa (2012) investigated Social performance of 878 microfinance institutions of 98 countries from during the era of 2000 to 2010. Social performance of microfinance institutions was evaluated on the basis of profit status, regulation status, age, assets as well as regulation status. The panel data was collected from Mix Market database estimated efficiency of microfinance institutions with the help of regression analysis. The results indicated that new, and younger as much as non-regulated institutions performs well as compared to old once and regulated institutes. If the financial institutions performs well, they must have bigger amount of assets and loan amounts as much as loan per loan officer.

Hassan & Shazad (2012) evaluated the challenges faced by microfinance institutions, which exterminate Poverty and empowering of women in Pakistan. Women empowerment and poverty alleviation are the main problems in Pakistan. The author highlighted some major problems that will reduce the poverty alleviation and increase women empowerment. Some problems faced by microfinance institutions were low Literacy rate, absence to reach the financial facilities, Informal cradle of finance, Managerial disabilities, Parallel Borrowing, Interest rate formation in Pakistan women suppuration and informal instrument of savings. These issues are reduced that it can increase the proficiency of microfinance organizations in Pakistan.

Kipsha (2012) investigated the efficiency of MFI's (Microfinance Institutions) in East African countries like Burundi, Tanzania, Rwanda, Uganda and Kenya. The panel data was used from 2009 to 2013 and Data envelopment analysis approach (Non Parametric approach) used for measure the efficiency of thirty five Microfinance institutions with five banks, seventeen NBFIs four Cooperation's and nine NGO,s . Two approaches were also used are production approach and "intermediation approach" under "constant returns to scale and variable returns to scale". The outcomes showed if the MFI's by utilize their resources in efficient way to increase the efficiency and also decrease the wastage of big amount. Most inefficiency-detected institutions still have the chance to improve them in the context of reached the frontier line.

Ferdousi (2013) explored the performance of the MFI's (Microfinance Institutions) in Asian countries i.e. India; china; and Bangladesh. He Collected data from microfinance institutions of sampled countries. Data Envelopment Analysis and Tobit regression analysis was used to measure the efficiency. The results showed that the institutes of India and china perform better as compare to Bangladesh on the efficiency scale of constant returns to scale

Tahir and Tehrim (2013) discussed the structure for efficiency in microfinance institutions of five countries i.e. Laos, Indonesia, Vietnam, Cambodia and Philippines. The "Data Envelopment Analysis" method was used to calculate the efficiency of microfinance institutes in five countries. Intermediation approach and production approach was used to calculate the efficiency of microfinance institutions.. The results showed that Efficiency was the essential dimension for Microfinance institutions sustainability.

Ahmad and Khan (2014) analyzed efficiency and performance of MFI's Microfinance institutions in India by means of monetary and non-financial behaviors with 4 operational parameters (outreach, financial efficiency and sustainability). Eleven year panel data of 97 MFI,s was collected in comparative and absolute form. The author applied Hausman test to discover the sustainability. The results showed that there exist positive relationship between gross loan portfolio numbers of depositors, total deposits, number of women borrowers.

Farooq and Khan (2014) discussed the financial functioning of Islamic and conventional microfinance institutions in Pakistan. Islamic Microfinance institutions provided small size loans to the poor according to Sharia in Pakistan to desired people. Time series secondary data from 2005 to 2010 was used to compare Islamic and conventional microfinance banks by using MIX Market technique. The results showed that Islamic microfinance banks are worthwhile and defensible as much as justifiable even in the nonappearance of collecting interests to their clients.

Mehmood and Khan (2014) examined and compared the efficiency of Islamic MFI's and Conventional MFI's in Pakistan using Panel data between the eras of 2008 to 2011 (4 years). "Data Envelopment Analysis" was used to measure the competence of specific conventional microfinance establishments but all of Islamic microfinance institutions in Pakistan. It was founded that two out of three IMF's functioning efficient boundary and conversely two out of nine Conventional MFI's and NGO's were inefficient according to criteria of technical efficiency.

Yilmaz (2014) measured the Efficiency of microfinance institutions in Turkey by the process of offered model. The data was collected from forty microfinance institutions of Turkey during the year of 2003 by using Profit Damaged data. "Data Envelopment Analysis" technique was uses to calculate the financial productivity of microfinance institutions. The findings of the study revealed that all microfinance institutions in Turkey were in early stage and they must need to be upgraded.

3. Methodology

To calculate efficiency of Microsoft institutions in Pakistan, input and output method was used. Three input variables i.e. loan amount disbursed, total staff and number of offices and two output variables i.e. "number of active borrowers and gross loan portfolio" has been taken for analysis. .

MFI's corporate structures in Pakistan

	MFB	MFI	RSP	NGO	CFI	Total
Total	10	16	8	19	2	55

There are approximately fifty-five microfinance institutions which are working in Pakistan (micro watch,Q3 2016). Out of 55 institutions, there are ten microfinance banks (MFB), sixteen microfinance institutions (MFI), eight RSP (Rural Support Program), nineteen Non-Government Organizations and two Commercial financial institutions (CFI).

3.1 Variable Description

Input Variables

Input Variables used in this study are as follows.

- ***Loan amount disbursed***
Loan amount disbursed that type of money, which paid to run any business in any field to the customer's

- **Total staff**

Total staff are all the human and output variables resource, which work for any Microsoft organization to do any operation.

- **Number of offices**

Number of offices are the institutions work place to give the loans.

Output Variables

Output Variables used in this study are as follows

- *Number of active borrowers*

Number of active borrowers are the individuals that receive loan from any organization and principally responsible repay after a specific time.

- *Gross loan portfolio*

Gross loan portfolio are the loans provides to the clients and did not written-off in any record and they did not receive any interest on it. That is the total amount lend to the clients of any MFI's.

In this, study two broader clutches as inputs and outputs used to portion the competence of Microfinance foundations in Pakistan. To calculate efficiency Microsoft institutions in Pakistan , three input variables i.e loan amount disbursed, total staff and number of offices and two output variables i.e “number of active borrowers and gross loan portfolio” has been taken.

3.2 Sampling techniques

There are approximately fifty-five microfinance institutions which are working in Pakistan (Micro Watch, Q3, 2016). Out of 55 institutions, there are ten microfinance banks (MFB), sixteen microfinance institutions (MFI), eight RSP (Rural Support Program), nineteen Non-Government Organizations and two Commercial financial institutions (CFI). In this study, I have chosen fifteen institutes based on gross loan portfolio of microfinance providers by using proportionate sampling. The selected microfinance institution from which data is collected are as follows

- **Microfinance Banks (MFB).**

Khushali Bank, Tameer Microfinance Bank.

- **Microfinance Institutions (MFI)**

Akhawat, Kashaf Foundation, Dameen Support Program, ASA Pakistan.

- **Rural Support Programs (RSP)**

National Rural Support Program, Thardeep Rural Support Program

- **Non-Government Organizations (NGO)**

BRAC Pakistan, Rural Community Development society, Al-Mehran Rural Development Organization, Shah Sachal Sami Foundation, Shadab Rural Development Program, Baidarie.

- **Commercial financial Institutions (CFI)**

Orix Leasing Pakistan.

	MFB	MFI	RSP	NGO	CFI	Total
Total	10	16	8	19	2	55
Sampled	2	4	2	6	1	15

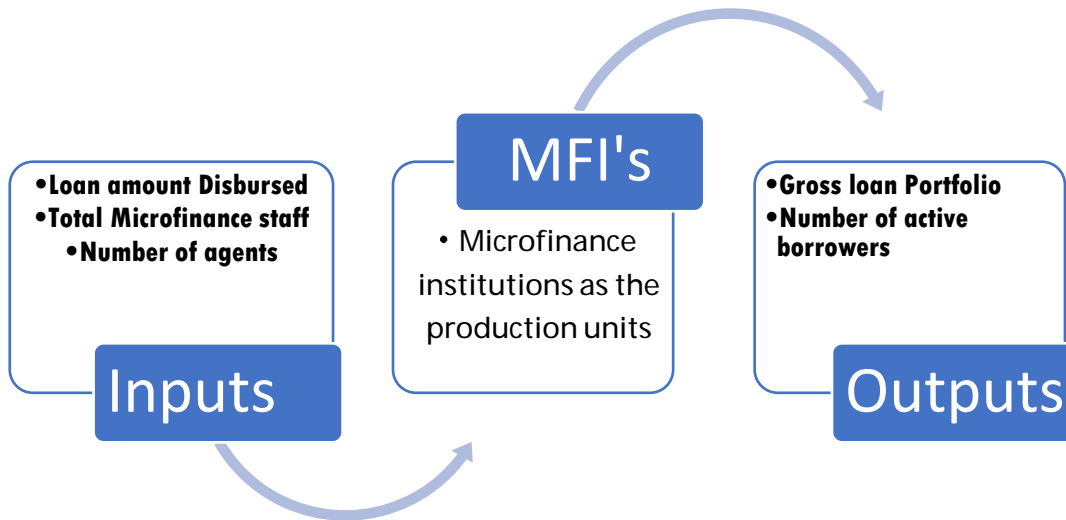
Theoretical Framework

For the current study, production approach is used to calculate the efficiency of microfinance providers.

Production Approach

In order to process transactions such as grant loans or capture deposits, under the production model, most of the financial institutions use human and physical resources. [Vassiloglou and Giokas (1990); Soteriou and Zenios (1999)].

Figure 1: Production Approach (conceptual Framework)



3.4 Data Envelopment Analysis

Data envelopment analysis is very efficient to find the efficiency [Mehmood & Khan (2014); Ahmad (2011); Tahir & Tehrim (2013), Kipesha (2012)] of any organization either it is public or private. It also calculate the profitability of any organization by enhancing input output resources. When we find efficiency of any organization weather public or private and their core objective is to gain profit by enhance of inputs or output resources,

In this study Data Envelopment analysis: A non-parametric technique is used to quantify the efficiency of microfinance institutions in Pakistan. In data envelopment analysis technique, it is very important technique to measure the linear broadcasting approximation. In this technique, Data Envelopment Analysis the Decision-making unit (DMU) is used. If score of the DMU is, lesser then one the organization is considered to be less efficient if score of decision making unit is one then the organization is considered to be efficient. Moreover, the efficiency of microfinance institutions is calculated by adopting input and output techniques.

3.5 Malmquist Productivity Index

Professor Sten Malmquist introduced Malmquist productivity index (MPI). MPI is very efficient technique to measure the year-by-year fluctuation in the status of Decision Making Units [Kortelainen, (2008)].

In this study, decision-making units determine the performance, which uses “n” inputs and “m” output, by adopting Malmquist productivity index. Technical and allocative efficiency are measured to evaluate the efficiency of MFI’s in Pakistan,

Technical efficiency refers to potential of DMU and it illustrate that how can output be increased by keeping the same level of input and “allocative efficiency” of a DMU refers to “marginal product” by comparing with its “marginal cost”.

Mathematical form of Malmquist productivity index is as follows:

$$M_o(X^{t+1}, Y^{t+1}, X^t, Y^t) = \frac{D_o^{t+1}(X^{t+1}, Y^{t+1})}{D_o^t(X^t, Y^t)} \left[\frac{D_o^t(X^{t+1}, Y^{t+1})}{D_o^{t+1}(X^{t+1}, Y^{t+1})} \frac{D_o^t(X^t, Y^t)}{D_o^{t+1}(X^t, Y^t)} \right]^{\frac{1}{2}} \dots \dots i$$

In this model external the braces is describes the alteration in “technical efficiency”, however, the symmetrical mean of the two proportions intimate the brackets calculates the movement in knowledge between the 2 decades “stand t + 1 future; and it shows next one year We can consider it progress in technology.

So:

$$\text{Efficiency Change} = \frac{D_0^{t+1}(X^{t+1}, Y^{t+1})}{D_0^t(X^t, Y^t)} \dots \dots \dots ii$$

$$\text{Technical Change} = \left[\frac{D_0^t(X^{t+1}, Y^{t+1})}{D_0^{t+1}(X^{t+1}, Y^{t+1})} \frac{D_0^t(X^t, Y^t)}{D_0^{t+1}(X^t, Y^t)} \right]^{\frac{1}{2}} \dots \dots \dots iii$$

In the above Equation technical shows, x_t = input vector in period of time t , y_t = output. Direction in period of time t , “ D_t = distance function at period of time t ”, “ D_{t+1} = distance function at period of time $t+1$ ”, “ x_{t+1} = input vector at period of time $t+1$ ”. “ y_{t+1} = output vector at period of time $t+1$ ”. To circumvent randomly selecting one boundary to calculate the catalogue, the (geometric-mean) pragmatic as keep an eye on in below equation:

$$M(X^{t+1}, Y^{t+1}, X^t, Y^t) = \sqrt{\frac{D^t(X^{t+1}, Y^{t+1})}{D^t(X^t, Y^t)} \times \frac{D^{t+1}(X^{t+1}, Y^{t+1})}{D^{t+1}(X^t, Y^t)}} \dots \dots \dots iv$$

“Malmquist productivity index” has already been adopted for the measurement of efficiency of microfinance institutions in Pakistan. Underneath Data Envelopment Analysis, Malmquist Index is a method which provide assistances to calculate the fluctuation in “Technical efficiencies” (TE) of two different time spans. “Malmquist index” helps to calculate the comparative productivity of the DMU,s (MFIs in our case) at production point ($t+1 X$, $t+1 Y$) with production points (t , $t XY$). If there is an improvement in productivity, the result of Malmquist index is greater than one, while if it is less than 1 it illustrates a downward trend in productivity and moreover if the index result is 1 then it shows no change in productivity from time period t to $t+1$. Scale efficiency is also a constituent upsetting efficiency transformation as described in succeeding equation (Mehmood and Khan 2014).

The formula for the change in the productivity is as follows

$$\text{“Productivity Change} = \text{Scale Efficiency Change} \times \text{Technical Efficiency Change} \times \text{Technical Change”}$$

Malmquist Index does not demand the information pertaining prices of inputs or outputs. Additionally, it does not need supposition of revenue expansion or price minimization (Balk, 1993).

4. Results and Discussion

This section explains the measurement of the efficiency of microfinance institutions in Pakistan. Data Envelopment Analysis is used to measure the efficiency of microfinance institutions in Pakistan.

4.1 Comparative Technical Efficiency Scores of MFI’s under CRS, VRS and Scale Efficiency

The results of the study are demonstrated by comparing the data of two different time spans i.e 2007 and 2017 by using DMU in Pakistan the results of variable returns to scale (VRS) shows that Thardeep rural support works efficient in Pakistan and others are inefficient in 2016 while on the other hand Khushali Bank works more efficient in 2007. The Rural development society near to efficient frontier 0.905 in 2016 but in 2007 it was 0.001. Damen support program 0.321 points efficient in 2016 but it is 0.002 points efficient in 2007. Sh Sachal sami foundation 0.232 points efficient in 2016. Others were less than 0.010 in 2016 as much as 2007. According to the variable returns to scale (VRS) Thardeep Rural Support Program and Shah Sachal sami foundation works efficiently in 2016 and only Khushali Bank was efficient in 2007 and Rural development program is near to efficient frontier in 2016 but in 2007 it was inefficient. Damen Support Program 0.336 points efficient in 2016 but in 2007 it was 0.002. ASA Pakistan, Orix Leasing Pakistan and National Rural Support are less than 0.200 points in 2016 but in 2007 it is near about to zero.

According to scale efficiency, Thardeep Rural Support program works efficient in 2016 and there are many banks that works efficient in 2007 i.e . Khushali Bank, Tameer Microfinance, Akhuwat, Kashf Foundation, Damen Support program, National Rural Support and Thardeep rural Support, Rural Development society and Orix Leasing Company.

While, Damen support Program, Brac Pakistan and Rural Development Society works Efficient in 2016

but in 2007 they were not efficient. Therefore, it concluded that in the year 2016 microfinance institutions are more efficient than the 2007 in all (i.e CRS, VRS and Scale Efficiency) frontiers.

Table 1: Comparative Technical Efficiency Scores of Conventional and Islamic MFIs under CRS and VRS

Sr #	DMU's	2016			2007		
		VRS	CRS	Scale efficiency	VRS	CRS	Scale efficiency
1	KHUSHALI BANK (KB)	0.002	0.054	0.034	1.000	1.000	1.000
2	TAMEER MICROFINANCE B	0.002	0.053	0.034	0.003	0.003	1.000
3	AKHUWAT (AKHU)	0.001	0.064	0.017	0.009	0.009	1.000
4	KASHF FOUNDATION (KASHF)	0.000	0.029	0.009	0.035	0.035	1.000
5	DAMEN SUPPORT PROGRAM	0.321	0.336	0.958	0.002	0.002	1.000
6	ASA PAKISTAN (ASA)	0.003	0.156	0.017	0.000	0.000	NaN
7	NATIONAL RURAL SUPPORT	0.007	0.167	0.043	0.000	0.000	1.000
8	THARDEEP RURAL SUPPORT	1.000	1.000	1.000	0.001	0.001	1.000
9	BRAC PAKISTAN (BRAC)	0.140	0.142	0.984	0.000	0.000	NaN
10	RURAL DEVELOPMENT SOCIETY	0.905	0.926	0.978	0.001	0.001	1.000
11	AL-MEHRAN ORGANIZATION	0.001	0.059	0.017	0.000	0.000	NaN
12	SH SACHAL SAMI FOUNDATION	0.232	1.000	0.232	0.000	0.000	NaN
13	SHADAB ORGANIZATION	0.007	0.030	0.239	0.000	0.000	NaN
14	BAIDARIE	0.002	0.053	0.034	0.000	0.000	NaN
15	ORIX LEASING PAKISTAN	0.096	0.130	0.739	0.001	0.001	1.000
	Mean	0.181	0.280	0.356	0.070	0.070	NaN

Table 2: Malmquist Index Summary of Microfinance Institutions in 2007

MFIs	2007				
	EFFCH	TECHCH	PECH	SECH	TFPCH
KHUSHALI BANK (KB)	4.794	0.960	4.277	1.121	4.604
TAMEER MICROFINANCE BANK .LTD	0.168	0.960	0.174	0.964	0.161
AKHUWAT (AKHU)	0.561	0.960	0.544	1.031	0.539
KASHF FOUNDATION (KASHF)	2.572	0.960	2.851	0.902	2.471
DAMEN SUPPORT PROGRAM (DSP)	0.137	0.960	0.104	1.312	0.131
ASA PAKISTAN (ASA)	*****	1.001	*****	0.368	*****
NATIONAL RURAL SUPPORT PROGRAMME	3.352	0.960	3.343	1.003	3.220
THARDEEP RURAL SUPPORT PROGRAMME	0.045	0.960	0.075	0.597	0.043
BRAC PAKISTAN (BRAC)	*****	1.001	*****	0.569	*****
RURAL COMMUNITY DEV SOCIETY	0.171	0.960	0.198	0.865	0.164
AL-MEHRAN RURAL DEVELOPMENT ORG	*****	1.001	*****	0.712	*****
SHSH SACHAL SAMI FOUNDATION (SSSF)	1.000	0.980	1.000	1.000	0.980
SHADAB RURL DEVELOPMNT ORGANIZATION	*****	1.001	*****	0.360	*****
BAIDARIE	*****	1.001	*****	0.507	*****
ORIX LEASING PAKISTAN LTD. (OLP)	2.883	0.980	1.642	1.756	2.826
Mean	*****	0.977	*****	0.796	*****

Note: EFFCH= "Technical Efficiency Change", TECHCH="Technological Change", PECH="Pure Efficiency Change", SECH= "Scale Efficiency Change", TFPCH="Total Factor Productivity Change".

Source: Authors own calculation using software DEAP

Table 3: Malmquist Index Summary of Microfinance Institutions in 2016

MFIs	2016				
	EFFCH	TECHCH	PECH	SECH	TFPCH
KHUSHALI BANK (KB)	4.677	1.090	0.404	11.584	5.097
TAMEER MICROFINANCE BANK .LTD	1.706	1.090	0.398	4.292	1.860
AKHUWAT (AKHU)	9.785	1.090	0.589	16.621	10.665
KASHF FOUNDATION (KASHF)	1.419	1.090	0.336	4.218	1.547
DAMEN SUPPORT PROGRAM (DSP)	0.682	1.090	0.336	2.029	0.744
ASA PAKISTAN (ASA)	0.051	1.090	0.336	0.151	0.055
NATIONAL RURAL SUPPORT PROGRAMME	1.059	1.090	0.370	2.863	1.155
THARDEEP RURAL SUPPORT PROGRAMME	0.327	1.090	0.336	0.973	0.357
BRAC PAKISTAN (BRAC)	0.536	1.090	0.336	1.592	0.584
RURAL COMMUNITY DEV SOCIETY	0.390	1.090	0.336	1.160	0.425
AL-MEHRAN RURAL DEVELOPMENT ORG	0.019	1.090	0.037	0.506	0.020
SHSH SACHAL SAMI FOUNDATION (SSSF)	0.000	1.044	0.000	22.409	0.000
SHADAB RURL DEVELOPMNT ORG	0.101	1.090	0.341	0.297	0.110
BAIDARIE	1.728	1.090	0.301	5.741	1.883
ORIX LEASING PAKISTAN LTD. (OLP)	*****	1.044	*****	1.000	*****
Mean	0.788	1.084	0.364	2.163	0.854

Note: EFFCH= Technical Efficiency Change, TECHCH=Technological Change, PECH=Pure Efficiency Change, SECH= Scale Efficiency Change, TFPCH=Total Factor Productivity Change.
Source: Authors own calculation using software DEAP

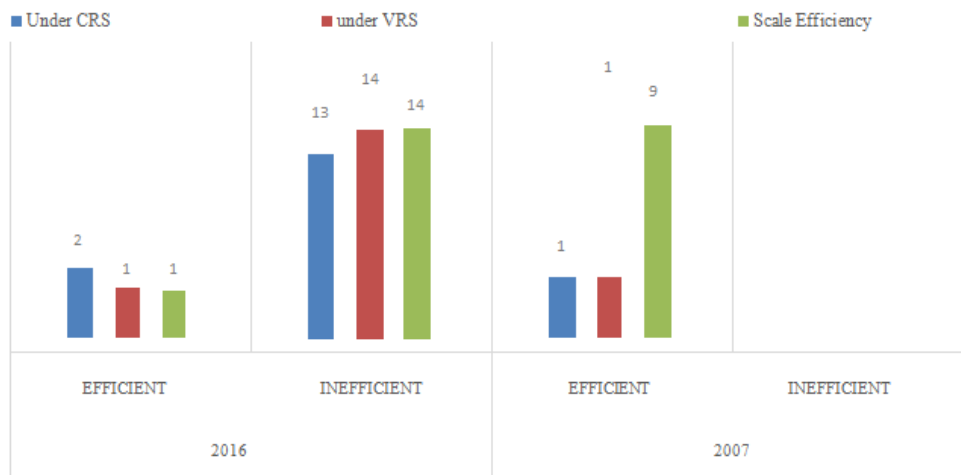
- The results of the study shows that Khushali Bank had the highest technical efficiency change in 2007 followed by National Rural Support Programme while in 2016, Akhuwat is at the top while calculating the technical efficiency change among the microfinance providers in Pakistan.
- The results of the study shows that ASA Pakistan, BRAC Pakistan, AL-Mehran Rural Development organization, Shadab Rural Development Organization and BAIDARIE had the highest Technological Change (TECHCH) in 2007 followed by Shah Sachal Sami foundation and ORIX Leasing Pakistan Ltd. While in 2016, all the Institutes were on the same level except Shah Sachal Sami Foundation while calculating the Technological Change among the microfinance providers in Pakistan.
- The results of the pure efficiency change shows that Khushali Bank had the highest Pure Efficiency Change in 2007 followed by National Rural Support Programme and while in 2016, Akhuwat is at the top followed by Khushali Bank among the microfinance providers in Pakistan.
- The results of the study shows that ORIX Leasing Pakistan had the highest Scale Efficiency Change (SECH) in 2007 followed by Damen Support Programme and while in 2016, Shah Sachal Sami Foundation is at the top followed by Akhuwat while calculating the Scale Efficiency Change (SECH) among the microfinance providers in Pakistan.
- The findings of the study illustrate that Khushali Bank had the highest Total Factor Productivity Change (TFPCH) in 2007 and National Rural Support Programme follows it. Moreover, in 2016, Total Factor Productivity Change (TFPCH) of Akhuwat is at the top followed by Khushali Bank while calculating the Scale Efficiency Change (SECH) among the microfinance providers in Pakistan.

4.2 Comparative Summary of Efficiency Aggregates of Microfinance institutions in Pakistan.

In the above table the pure technical efficiency in 2016 very little change in Shah Sachal sami foundation but in 2007 it is non constant trend but most of the time it is constant. According to pure efficiency change we can say that in year in 2016 there is constant trend regardless of some institutions but in 2007 it is change over time. The technical efficiency change of Khushali Bank is grater from all banks in 2007 as much as in 2016. On the other hand, scale efficiency of Khushali Bank is much greater in 2016 as 11.684 and the year 2007, it is 1.121 as much as there is variable trend it varies bank. Total factor productivity change is also grater in Khushali Bank in 2007 but in 2016, it is grater in Akhuwat. The

overall results concluded that institutions should want to increase the technical efficiency change EFECH because it is decreases in 2016 as compare to 2007.

Figure 02: Comparative Summary of Number of Efficient/Inefficient Microfinance institutions



The above diagrams showed that 2 out of 15 institutions are efficient with according to constant returns to scale, 1 efficient according to variable returns to scale and 1 in scale efficiency. Rest of the institutions are inefficient in 2016. On the other hand, 1 is efficient according to variable returns to scale as much as variable returns to scale. Moreover, 9 efficient with according to scale efficiency.

4.3 Comparative TFP Scores of Microfinance Institutions (MFIs) over time

Now in this portion of the study discusses separately TFP “(Total Factor Productivity)” scores showed and discussed in different time period is that results calculated based on input variable divided by the output variable. So loan amount disbursed as input variable and gross loan portfolio is the output variable. The results showed the difference between two time lags. I.e Q1 2007 and the Q1 2016. There in 2007 Kashaf foundation works better in 2007 but in 2016 decrease their productivity from 0.504699 to 0.430085. Damen Support program also decrease their productivity in the year 2016 like 0.428739 to 0.409239 as much as Akhuwat 0.497855 to 0.398219. Rest of the institutions increase their productivity with the compare of previous year to next year. The Khushali Bank improves its productivity from 0.359384 to 0.404099 and Tameer Microfinance bank 0.220047 to 0.343467 as much as Thardeep Rural Support Program improves too much as 0.195871 to 0.432241

Table 4: Comparative TFP Scores of Microfinance Institutions (MFIs) over time

	TFP	
	2016	2007
KHUSHALI BANK (KB)	0.404099	0.359384
TAMEER MICROFINANCE BANK .LTD	0.343467	0.220047
AKHUWAT (AKHU)	0.398219	0.497855
KASHF FOUNDATION (KASHF)	0.430085	0.504699
DAMEN SUPPORT PROGRAM (DSP)	0.409239	0.428739
ASA PAKISTAN (ASA)	0.444784	0
NATIONAL RURAL SUPPORT PROGRAMME	0.471335	0.433681
THARDEEP RURAL SUPPORT PROGRAMME	0.432241	0.195871
BRAC PAKISTAN (BRAC)	0.873825	0
RURAL COMMUNITY DEV SOCIETY	0.445802	0.369948
AL-MEHRAN RURAL DEVELOPMENT ORG	0.621477	0
SHSH SACHAL SAMI FOUNDATION (SSSF)	0	0
SHADAB RURL DEVELOPMNT ORGANIZATION	0.376889	0
BAIDARIE	0.130848	0
ORIX LEASING PAKISTAN LTD. (OLP)	0.394041	0.199007
Mean	0.411757	0.213949

(Source: Author's own calculations)

5. Conclusion

The study concludes "Technical Efficiency" and "Total Productivity" of microfinance institutions of Pakistan.

The results of the study conclude that technical efficiency provides us best performance Decision Making Units DMUs from 2007 to 2016. It is found that in 2007, only one microfinance institute in Pakistan out of 15 and only one in 2016 MFI's, NGO's, RSP's, MFB's, CFI's works on the efficient frontier. However, generally, an assessment of proficiency of these both kinds of organizations provides an irresistible advantage to the MFIs and NGO in 2016 as compare to 2007.

In the light of overhead results, we accomplish that the microfinance institutions in 2016 were more efficient as compared to 2007. However, microfinance institution are more concentrating on further growth in terms of their factor productivity. Objective oriented training should be arranged for the staff as much as for the clients to generate the awareness of microfinancing in Pakistan. In the coming years, auxiliary research should be conducted by having a larger data set of IMFIs to quantify their efficiency for the comparison between NGO's and MFIs. Enhancement in technology and improvement in managerial skills can decrease the inefficiency.

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