Appraising Efficiency of Conventional and Islamic Microfinance Institutions in India using Data Envelopment Analysis

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ABSTRACT

Purpose- The purpose of the present work is to find out the efficiency of Islamic microfinance institution compared to the conventional microfinance institution in Kerala, India.

Design/methodology/approach- The study used primary data which are collected using the convenience sampling method. Thus, in total, the study used 60 institutions (30 institutions from each of the stream). The data collected for the four years: 2019-20 to 2022-23. The study used both Input and output method under constant returns to scale and variable returns to scale. The analysis of the data is done by using Data Envelopment Analysis and Independent t-test.

Findings- It is evident from the result; the average efficiency of Islamic microfinance institutions is higher than their conventional counterparts and that there is no significant difference between the efficiency scores of both institutions.

Research limitations/implications- The limitation of the study is that though India has more than 150 million Muslim population, yet Islamic finance is not popular in all the states. Therefore, the data from another state could not be collected.

Practical implications- It is one of the excellent evidence for the policymakers and regulatory agencies to understand the significance of Islamic finance.

Social implications- Most of the customers of Islamic microfinance institutions are poor. Hence, these are serving poor people without charging any interest, yet their business model is viable.

Originality/value- The work is carried out to find out at the ground level the efficiency of Islamic microfinance institutions. It is the first study of its kind regarding India and will add value to the existing literature.

Keywords: *Islamic Microfinance, Data Envelopment Analysis, Technical Efficiency, Pure Technical Efficiency, Scale efficiency*

INTRODUCTION

"It is commonly acknowledged that the vital economic aim of Islam is to build up and maintain an affluent financial and democratic social configuration in which all people irrespective of their sex, religion, caste and other demographic factors can take advantage of their rational capabilities. They can safeguard and endorse their healthiness and energetically donate to the progress of society" (Rehman, 2008).

In Islamic microfinance institutions, the Islamic financial principles are combined with the conventional microfinance system. It is a system free from Riba or Interest; risk, as well as profit, should be shared between borrower and lender in a certain way; all transactions should be free from Gharar and Maisir (uncertainty and fraud) etc. The main aim of these organizations is to offer affordable credit to the needy individual on zero interest. The concept of Islamic microfinance has its root in the Prophet's era. Various caliphs and governors had implemented this system in their territories. However, only after the extensive introduction of modern Islamic banking, the notion of modern Islamic microfinance has become popular. Now the system is present in more than 80 countries in the world.

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Though the microfinance system was initiated in the world to alleviate the exploitation by local money lenders, commercial banks and other agencies, this system very ironically turned into one more way of exploitation. Conventional micro-financiers impose an interest rate of more than 20 percent upon the borrowers. These borrowers are compelled to approach the microlenders due to unavailability of other options. This nature of microlenders intensifies the cases of suicides as the World Bank analyst Sudhindher Sharma's opinion is "the rural suicides cast a dark shadow on the fledging micro finance sector" (Kunzemann, 2008). According to Sharma, the usury rate increases up to 40 percent, and recovery system mainly depends upon threatening of the poor. The system ultimately leads to suicide. Famous Bangladesh's Grameen Bank is also an instance of exploitation owing to its high rate of interest. A broad study which covers 13 microfinance institutions discloses that the benefit of the institutions is solely for upper and middle class and hence the motto of this system is not attained (Hulme and Mosley,1998). In this alarming situation, the importance of Islamic microfinance system has increased. As several studies reveal that these institutions are not only beneficial for the destitute but also exceedingly efficient (Chowdhury and Bhuiya,2004).

The remainder of this paper is structured as follows. The next section reviews the related literature and presents objectives and hypothesis to be tested, followed by an illustration of the research method for the paper in section 3, followed by data analysis in Section 4. The paper ends with the conclusion and policy implications in section 5.

REVIEW OF LITERATURE

The Islamic finance in recent years has gained popularity and is emerging as an alternative to the conventional financial system, the available literature in the field, especially empirical, in nature, particularly in Indian context is limited. There are several theoretical studies but the empirical studies which particularly signify efficiency are infrequent.

There are studies based on Islamic Microfinance institutes of India. The studies have not considered their efficiency, rather they are largely conceptual in nature. Study conducted by Ameer (2013) found that IMFIs have a positive impact on poverty alleviation. Hasan (2014) Discussed that services of IMFIs help in economic development through productive management of local resources. Syed (2017) concluded that the institutes performed well on various basis. It has a positive impact on the socio-economic lives of the beneficiaries.

Data Envelopment analysis is used in the efficiency studies. In order to overcome the shortcomings of the conventional efficiency measure, such as, ratio analysis, the DEA was proposed by Charnes, Cooper and Rhodes (1978). It was based on the earlier work of Farrell (1957). In the literature of DEA, different Measures have been discussed. Constant returns to scale Measure are known as CCR model. CCR model has been explained by Cooper et al. (2000), Sowlati (2001), and Sherman &Zhu (2006). Another measure, used in the literature on DEA is variable return to scale. Banker, Charnes and Cooper (1984) developed this model which is known as BCC model. The overall efficiency is classified as pure technical and scale efficiency under BCC model.

Earlier, it was believed that DEA can be used in banks only (Shyu & Chiang, 2012). But later, it has been applied in several sectors for efficiency measurements. For instance, it has been applied in insurance sector. Kaffash et al. (2019), Borges et al. (2008) and Ilyas Ashiq (2019) have calculated the efficiency of insurance companies using DEA on the basis of output method. There are several studies, which have used both input as well as output. Chen (2007) applied DEA on efficiency of hotels in Taiwan. Pacheco and Fernandes (2003) analyzed the efficiency of Brazilian airports.

DEA is extensively applied to measure efficiency of microfinance institutes. Haq, Skully and Pathan (2009) examined the efficiency of thirty-nine microfinance institutes in Latin America, Africa and Asia. The study found that nongovernmental microfinance institutions are highly efficient under the production approach. In the case of the intermediation approach, the microfinance institutions which are running as part of banks, outperform the other institutions. There are several other studies also which have applied DEA to measure efficiency of microfinance institutions, situated in different countries. Abdelkader, Hathroubi. and Jemna (2012) assessed the performance of microfinance institutes in the MENA region using the Data Envelopment Analysis. As per the results, the average efficiency of most of the countries has reduced. It is also found that the efficiency

significantly differs in accordance with the legal status of the institutions. Ferdousi. (2013) explores the efficiency of institutions engaged in micro financing situated in China, Bangladesh and India. The results obtained using the Data Envelopment Analysis, indicate microfinance institutes in Bangladesh are more efficient than those of India and China with the assumption of variable returns to scale. Conversely, the Chinese and Indian micro financial institutions performed better in terms of constant returns to scale.

DEA has also been applied in such cases also, where microfinance institutions are from a single country. Tahir, Nurzahira and Tahrim. (2015) found the efficiency of Cambodian microfinance institutions using the Malmquist Index of Productivity and Data Envelopment Analysis. According to the results, the overall efficiency of 92 percent was recorded. The study found that an important source of efficiency is stemmed from scale efficiency rather than pure technical efficiency. As per the results, the microfinance institutions are performing well in scale of functions. They are not able to manage their assets and cost of operations. Onour and Abdalla (2011) investigated the efficiency of 12 Sudan's financial institutes. The study employed the intermediation approach. As per the DEA, the largest MFIs and middle-sized MFIs are showing high pure and scale efficiencies. However, the smallest MFIs showed the highest pure technical efficiency without the scale efficiency. So, the study concluded that the size and ownership are not the factor in determining the managerial efficiency i.e. pure technical efficiency.

Studies are available, which are based on efficiency of microfinance institutions of India. Singh, Mahapatra, Mukherjee and Bhar (2014) examined the efficiency of twenty Indian microfinance institutions applying Data Envelopment Analysis with output method. The study revealed that out of twenty microfinance institutions, only three are efficient. The study further discusses the reasons behind the performance of inefficient firms. Singh (2014) examined the efficiency of 30 Indian microfinance institutions using data collected from microfinance Information Exchange. The study applied a modified form of Data Envelopment Analysis with inputs replaced by some control factors and outputs replaced by performance parameters. The results highlight high inefficiency in most of the institutions.

Data Envelopment Analysis has also been used to assess efficiency of Islamic microfinance institutions. Aliyar (2010) examined the efficiency of Islamic microfinance institutions in Bangladesh and found that the Islamic microfinance institutions are providing more credits, employment and other benefits than those of their counterpart. Scale, technical and pure technical efficiencies have been utilized in the study. The study further found that even though the Islamic microfinance institutions are not comparatively efficient in decreasing cost. These institutions are extremely competent in generating profit. The inefficiency is owing to low scale, not because of technical reasons. Abd-el-Kader and Salem (2013) examined in the Middle East and North Africa (MENA) region, the performance of Islamic microfinance institutions. They compared their efficiency scores with those of traditional institutions. Their study found that the efficiency scores of both the types of the institution have no significant difference.

Similar result has been found by several other studies which are based on evaluating efficiency of conventional and Islamic microfinance institutes. or banks. Mohammad (2008), Samad (2004) Abdelkader and Salem (2013) concluded that there is no difference between efficiency of both the institutions. Aliyar (2010) found that although Islamic banks at the global level are not as much of efficient in reducing cost, they are comparatively efficient in making profit and primary element of inefficiency is owing to allocative inefficiency not technical inefficiency. Shahid, Rehman, Niazi and Raoof (2010) and Akthar (2011) has also found inefficiency of Islamic banks compared to conventional banks. Similarly, Yudistira (2003) has also found same result.

Several studies have found contrary results also. Arslan and Ergec (2010) and Awan (2009) found that performance of Islamic financial institutions is comparatively better. Similarly, Loghod (2006) found significant difference between performance of Islamic financial institutions and conventional financial institutions.

In recent years, studies have begun to explore efficiency evaluation more rigorously using updated data and advanced DEA models. For instance, Rahman and Rosman (2019) applied DEA to Islamic MFIs in Indonesia, highlighting significant differences in managerial efficiency based on institutional governance structures. Similarly, Ahmed, Hassan, and Siddiqui (2022) examined Islamic and conventional MFIs in Pakistan using a

two-stage DEA model and concluded that while Islamic MFIs are relatively newer, their efficiency is converging with their conventional counterparts. A recent study by Khan and Parveen (2023) focused on Islamic microfinance institutions in Malaysia and Indonesia using DEA and bootstrap regression techniques. The study found that governance quality, outreach, and Shariah compliance significantly influence technical and scale efficiency, emphasizing the need for a hybrid performance evaluation model for IMFIs. However, these recent studies are largely focused on South-East Asian and MENA regions, with India remaining underrepresented in the empirical literature.

Hence, the review of the available literature reveals that Islamic banks or microfinance institutions in India have been studied but their efficiency has not been considered. Efficiency of the firms of various sectors situated in several countries, have been measured using DEA in various studies. DEA has also been applied to evaluate traditional microfinance institutions of India. Efficiency of conventional and Islamic microfinance institutions have been compared using DEA in case of several countries. thus far, there is dearth of studies which have considered efficiency of Islamic microfinance institutions in India using DEA. The present study tries to fill this gap.

Research Objectives and Hypothesis

As the previous section indicates, several studies are available, which are based on efficiency scores of Islamic microfinance institutions and their comparison with efficiency scores of the conventional microfinance institutions. Such studies have been conducted only in a few countries, but India has not been considered for the purpose. Thus, this study aims to examine the comparative performance of Islamic and conventional microfinance institution in the state of Kerala, India. Moreover, the study attempts to find out the significant difference in technical, pure technical and scale efficiencies of Islamic microfinance institutions and traditional microfinance institutions.

To accomplish the objectives, the study formulates the following hypothesis:

H (0): There is no significant difference between efficiency scores of Islamic and Conventional microfinance institutions in India.

RESEARCH METHOD

The study uses primary data collected from Kerala. Kerala is selected as a sample state because it is the only one state in India which is demonstrating some motivation and interest towards the implementation of Islamic finance. Due to its demographic specifications, high literacy rate and comparatively a more significant number of Muslims, the state is positive towards this system irrespective of political contentions and substantial regulatory hurdles, the government of Kerala took various initiatives towards the development of this system in the state. Although, the regulatory hurdles restrict the people and organizations to start full-fledged Islamic financial institutions.

Convenience sampling is used in the process of data collection because most of the institutions are not willing to share the information due to the fear of regulatory authorities. Questionnaires were distributed among the institution after their pre-consent. The study used 60 institutions (30 institutions from each of the stream). The data have been collected for a four-year period:

2019-20,2020-21, 2021-22 and 2022-23.

Banker et al. (1989) proposed correct sample size for Data Envelopment Analysis as: “Let ‘m’ is the number of inputs and ‘s’ is the number of outputs, then according to them, the sample size ‘n’ should have to be $n \geq$ maximum $[m \times s, 3 (m + s)]$”.

As in the present study, a total of 4 inputs and outputs have been used (two from each). 60 institutions are quite adequate. The questionnaire was first written in English and then translated into the local language of Kerala, i.e. Malayalam.

The data have been analyzed using DEA and Independent t-test. Data Envelopment Analysis has been conducted applying the software DEAP, and independent t-test is performed using SPSS.

Data Envelopment Analysis

Data Envelopment analysis is a non-parametric method which is utilized in the efficiency studies. To overcome the limitations of the traditional performance analysis measure, i.e. ratio analysis, the DEA was established by Charnes, Cooper and Rhodes (1978). It was based on the earlier work of Farrell (1957). This study uses both Input and output Method under variable returns to scale and constant returns to scale. Input method deals with the inputs only while the outputs are controlled, and the output method deals with outputs only by controlling the inputs. Under input method, an inefficient firm tries to be efficient by decreasing the inputs while under output methods, outputs are maximized. Returns to scale refer to the decrease or increase in efficiency based on the size of the firm or scale of the operation. The constant return to scale imitates the capability of the producers to expand output and input linearly without changing inefficiency. In the literature of DEA, constant returns to scale Measure are known as CCR model. CCR model has been explained by Cooper et al. (2000), Sowlati (2001), and Sherman &Zhu (2006). This model can be exemplified as:

"Assume there are n number of DMUs, such as DMU_1, DMU_2, DMU_3.... DMUn; with m number of inputs, such as, X_1, X_2, X_3..., Xm and s number of outputs, such as, Y_1, Y_2, Y_3. ..Ys. The following fractional programming model can be worked out to get the efficiency score"

$$\text{Maxim } h_k = \frac{\sum_{r=1}^{s} u_r \, Y_{rk}}{\sum_{i=1}^{m} v_i \, x_{ik}}$$

$$\text{Subject to, } \frac{\sum_{r=1}^{s} u_r \, Y_{rj}}{\sum_{i=1}^{m} v_i \, x_{ij}} \leq 1, \qquad j = 1,2,3,.....,n$$

$$u_r \geq \varepsilon \quad r = 1,2,3,.....s$$

$$v_i \geq \varepsilon, \quad i = 1,2,3,.....m$$

Banker, Charnes and Cooper developed BCC model in 1984 which is known as variable return to scale. The overall efficiency is classified as pure technical and scale efficiency under BCC model. According to Sowlati (2001), the formula for BCC Input oriented model is:

$$\text{Maximize } h_k = \sum_{r=1}^{s} u_r \quad Y_{rk} + u_k$$

$$\text{Subject to} \qquad \sum_{i=1}^{m} v_i \quad x_{ik} = 1$$

$$\sum_{r=1}^{s} u_r \quad Y_{rj} - \sum_{i=1}^{m} v_i \quad x_{ij} + u_k \leq 0 \qquad j = 1,2,3,....n$$

$$u_r \geq \varepsilon \; r = 1,2,3,.....s$$

$$v_i \geq \varepsilon, \quad i = 1,2,3...m$$

$$u_{kfree}$$

As per Sowlati (2001), the formula for BCC output-oriented model is given as:

$$\text{Minimize } q_k = \sum_{i=1}^{m} v_i \quad x_{ik} + v_k$$

$$\text{Subject to } \sum_{r=1}^{m} u_r \quad Y_{rk} = 1$$

$$\sum_{i=1}^{m} v_i \quad x_{ij} - \sum_{r=1}^{s} u_r \quad Y_{rj} + v_k \geq 0 \qquad j = 1,2,3,....n$$

$$u_r \geq \varepsilon_r = 1,2,3,.....s$$

$$v_i \geq \varepsilon, \quad i = 1,2,3...m$$

$$v_{kfree}$$

Input and Output Specification

In data envelopment analysis, the output and input specification isa significant step. However, there is no accepted rule to specify these variables except to depend upon the past works. Therefore, this study is also based on previous literature like Abdelkader and Salem (2013), Gutierrez – Nieto et al. (2009) Ben (2008), Haq et al. (2010), Baseem (2008), Ahmad (2002), Adair &Berguiga (2010), Tahir et al. (2013), Ahmad (2011), Kipesha (2013) and Kipesha (2012).

In India, microfinance institutions are not allowed to receive deposits. Therefore, the important service (outputs) they are providing is the loan portfolio. Hence the study uses loan amount and number of borrowers as the outputs. For producing these outputs, microfinance institutions use labour and expenses. Thus, total expenses and the number of employees is the inputs. The intermediation approach has been followed in the current study. The approach is inconsistency with the past studies like Kipesha (2012), Yudistira (2003), Nawaz (2010), Abdelkader and Salem (2013), Kipesha (2012), Nasution (2013).

DATA ANALYSIS

Descriptive Statistics

Table 1 demonstrates the descriptive statistics of both inputs as well as output variables for the four years. While considering the mean values of both input and output variables, it can be easily inferred that the difference between the mean values of both types of institutions is enormous. Islamic microfinance institutions are comparatively very small since there are regulatory hurdles in the path of its progress. In the case of output variables in Conventional microfinance institutions, both the variables are depicting an upward trend as the average value is increasing in all the four years. The number of borrowers increased to 32800 in 2020-21 from 25600 in 2019-20. It further increased to 5300 in 2021-22.

Table 1: *Descriptive Statistics of I/O variables*

Variables		Mean	SD	Mean	SD
		Output Variables			
	Years	Conventional MFIs		Islamic MFIs	
No of Borrowers	2019-20	25600	61243.511	439.6	434.055
	2020-21	34800	76822.22	527.97	521.251
	2021-22	53100	130013.243	717.47	728.841
	2022-23	64700	164568.182	727.7	689.885
Loan Amount	2019-20	151000000	381500000	963000	1420899
	2020-21	247000000	577100000	1140000	1508243
	2021-22	418000000	965600000	1450000	2092535
	2022-23	532000000	1380000000	1170000	1416632
		Input Variables			
Total Expenses	2019-20	12900000	48060000	7612.03	8838.03
	2020-21	21600000	59460000	7310.87	7990.46
	2021-22	29800000	74930000	6925.77	8025.34
	2022-23	31800000	79110000	8165.27	8194.42
No of Employees	2019-20	115.9	299.358	2.87	2.501
	2020-21	138.4	309.527	3.07	2.504
	2021-22	184	414.461	3.17	2.547
	2022-23	226.2	545.693	3.53	2.909

The trend continued, and the variable reached up to 64700 in the year 2022-23. However, in Islamic microfinance institutions, an average number of borrowers increased from 439.6 in 2019-20 to 727.7 in 2022-23. The average amount of loan increased in the first three years (Rs 963000 to Rs 1450000) but it declined to

1170000 in the last year 2022-23. The standard deviation also illustrates similar trends for both types of institutions. The case of input variables is also not different. The average values of both input variables increased across the years for conventional microfinance. In the case of Islamic microfinance institutions, the variable "average number of employees" increased from 2.87 in 2019-20 to 3.53 till 2022-23. Average total expenses reached to 8165.27 from 7612.03 during the period. It increased in all the years except 2021-22, where the figure was 6925.

Efficiency Scores

Table 2 depicts the score of efficiency of both types of the institution selected for the study based on input and output methods using the technical, pure technical and scale efficiency scores.

Table 2: *Efficiency Scores*

	Islamic MFIs				**Conventional MFIs**			
	Input Method		**Output Method**		**Input Method**		**Output Method**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
				2022-23				
TE	.520167	.3362403	-----	----	.317267	.2714337	---	----
PTE	.737767	.3251391	.659500	.3509027	.583900	.3856732	.602467	.3729314
SE	.701533	.2866793	.763800	.2211923	.602600	.2835310	.565667	.2280808
				2021-22				
TE	.493933	.3113924	----	-----	.383900	.2911348	----	-----
PTE	.728100	.3143781	.691267	.3168833	.602667	.3569316	.611000	.3725610
SE	.679100	.2801923	.715600	.2437436	.660067	.2678816	.685900	.2641989
				2020-21				
TE	.479367	.3436706	----	-----	.366233	.2676567	-----	------
PTE	.737267	.3164090	.672967	.3444324	.584667	.3409797	.590600	.3643972
SE	.641233	.3207382	.704833	.2888856	.676533	.2741301	.671567	.2608849
				2019-20				
TE	.533233	.3727036	------	-----	.419233	.3070845	-----	-------
PTE	.728567	.3270798	.689367	.3527801	.568067	.3648371	.546433	.3723481
SE	.718133	.3227893	.752200	.2770231	.775033	.2380066	.809033	.2080365

In the year 2022-23, according to table 2, under the input method, the average score of technical efficiency for Islamic microfinance organizations is 0.520167. The same for conventional organizations is 0.317267. Similarly, the pure technical and scale efficiency of Islamic microfinance organizations are 0.73777 and 0.7015, respectively. For conventional microfinance institutions, they are 0.5839 and 0.6026, respectively. In the case of the output method, the pure technical efficiencies and scale efficiencies of Islamic firms are 0.6595 and 0.7638, respectively. For conventional firms, they are 0.60247 and 0.56567, respectively.

Similarly, in the year 2021-22, technical, purely technical, and scale efficiency for Islamic microfinance organizations are recorded as .493933, .728100, and .679100 respectively. For conventional financial institutions, the scores are.383900, .602667 and .660067 respectively in case of input method. Moreover, in the case of the output method, the mean score of pure technical and scale efficiency are .691267 and .715600 for Islamic microfinance institutions and .611 and .6859 for traditional micro-financial institutes. For the year 2020-21 also, the efficiencies show the same trends. The three efficiency scores for Islamic institutions under input method are recorded as .479367, .737267 and .641233, respectively. The same scores for conventional micro finance institutes are.366233, .584667 and .676533. The values for pure technical and scale efficiency in case of output method are observed as .672967 and .704833 for Islamic microfinance institutions and .5906 and .671567 for traditional microfinance institutions. In the first year, 2019-2020, the three efficiency scores can be observed

for Islamic microfinance institutions under input method as .533233, .728567 and .718133 respectively whereas these scores for conventional microfinance institutions are .419233, .3648371 and .775033 respectively. In the same way, under the output method, pure technical and scale efficiency is .689367 and .752200 respectively for Islamic microfinance institutions, while for Conventional microfinance institutions, these efficiencies are .546433 and .809033 respectively.

Thus, it can be concluded that the performance of the conventional microfinance institutions in 2019-20 has higher efficiency score under the output method compared to the Islamic microfinance institutions. For remaining all the years under both the methods, the three efficiency scores of Islamic microfinance institutions are higher. Hence, Islamic microfinance institutions are comparatively better than traditional micro-financial institutions in utilizing the inputs and maximizing outputs.

Table 3 compares the total number of efficient firms from each category. According to the table, the number of efficient Islamic microfinance institutions are greater than that of conventional microfinance institutions in all the cases (technical efficiency, pure technical efficiency and scale efficiency). For instance, an average number of institutions which are efficient as per technical efficiency in case of input method for Islamic and traditional institutions are 5.5 and 2.25 respectively. It denotes that a higher number of Islamic microfinance organizations are successful in the utilization of input for producing maximum output. The number of efficient Islamic and conventional firms in scale efficiency under input method are 5.5 and 2.5, respectively. While under output method, they are 6 and 3.5 respectively. The higher number of efficient Islamic firms in scale efficiency indicates that their management is highly competent in managing the size and resources of the firms.

Table 3: *Total Number of Efficient Firms*

Years	Islamic MFIs					Conventional MFIs				
	Input Method			Output Method		Input Method			Output Method	
	TE	PTE	SE	PTE	SE	TE	PTE	SE	PTE	SE
2019-20	6	15	6	11	8	2	10	2	9	3
2020-21	4	12	4	10	4	2	9	2	9	3
2021-22	5	14	5	12	6	2	7	2	7	2
2022-23	7	13	7	10	6	3	10	4	8	6
Average	5.5	13.5	5.5	10.75	6	2.25	9	2.5	8.25	3.5

Testing of Hypothesis

To explore further, independent t-test has been used. Table 4 exemplifies the independent t-test values. To examine whether there is any significant difference between the efficiency scores between the two types of the institution under study, t-test is employed. The table shows p values and t statistics of the technical, pure technical and scale efficiency in case of both methods (input and output) for the four years.

According to the table, P values for technical efficiency in case of input method and scale efficiency in case of output method for the year 2022-23 are significant at 5 percent significance level because the p values of both efficiencies for the year are below 0.05. It can, therefore, be said that there is a significant difference between the efficiency of Islamic microfinance institutions and traditional microfinance institutions in technical efficiency in case of input method and scale efficiency in case of output method in the year 2022-23. In all other cases, such a significant difference is not found. Thus, out of 20 cases, only in 2 cases, the hypothesis has been rejected. The results are consistent with the previous studies, such as Mohammad (2008), Samad (2004) and Abdelkader and Salem (2013).

Table 4: *Independent t-test*

YEAR		Input Method			Output Method	
		TE	PTE	SE	PTE	SE
2019-20	t value	-1.29	-1.79	0.777	-1.53	0.90
	p value	0.20	0.78	0.44	0.13	0.37
2020-21	t value	-1.42	-1.80	0.46	-0.90	-0.47
	p value	0.16	0.08	0.65	0.37	0.64
2021-22	t value	-1.41	-1.44	-0.27	-0.90	-0.45
	p value	0.16	0.15	0.79	0.37	0.65
2022-23	t value	-2.57	-1.67	-1.34	-0.61	-3.42
	p value	0.01***	0.10	0.18	0.54	0.000***

CONCLUSION AND POLICY IMPLICATIONS

The present study attempts to find out the efficiency of Islamic microfinance institution compared to the conventional microfinance institution in India using data envelopment analysis. The study employs two input and two output variables from 30 Islamic microfinance institutions and 30 traditional microfinance institutions. In the case of input and output methods, the study assesses and analyzes the technical, purely technical, and scale efficiency. The results of the DEA show that the number of Islamic microfinance institutions is higher as far as the total number of efficient microfinancing firms are concerned. In the context of average efficiency also Islamic microfinance firms are comparatively more. This implies that these organizations are comparatively much efficient in maximizing their output using the least input. The results confirm findings of the previous studies, such as, Arslan and Ergec (2010) and Awan (2009). The results of t-test confirm that in most of the cases there is no significant difference between the efficiency scores of both, Islamic as well as traditional microfinance institutions. The results discard findings of earlier studies. Shahid et al (2010), Akthar (2011) and Yudistira (2003) have found contradictory results. From the result of t-test, it can be inferred that, in spite of the small size and legal barriers, the Islamic microfinance institutions are not less efficient than conventional microfinance institutions. Without charging interest Islamic microfinance institutions are financially viable. The conventional microfinance institutions are also financially viable but their high rate of interest results in debt trap and exploitation. As far as the social implication is concerned, most of the customers of Islamic microfinance institutions are extremely poor. It is an established fact that only the poor's approach to micro finance institutes. Hence, these are serving poor people without interest. Still, their business model is viable. Thus, if Islamic finance is allowed formally to commence its full-fledged operations in India, it would be a win-win situation for both society as well as the Islamic microfinance institutions or banks. It is apparent evidence for the policymakers and regulatory agencies to understand the significance of Islamic finance

REFERENCES

Abduh, M., & Omar, M. A. (2012). Islamic banking and economic growth: The Indonesian experience. *International Journal of Islamic and Middle Eastern Finance and Management, 5*(1), 35–47. https://doi.org/10.1108/17538391211216811

Ahmad, A., & Luo, R. H. (2010). Comparison of banking efficiency in Europe: Islamic versus conventional banks. In S.-J. Kim & M. D. McKenzie (Eds.), *International Banking in the New Era: Post-Crisis Challenges and Opportunities* (Vol. 11, pp. 361–389). Emerald Group Publishing. https://doi.org/10.1108/S1569-3767(2010)000011016

Akhtar, W., Raza, A., & Aurangzeb, H. (2011). Efficiency and performance of Islamic banking: The case of Pakistan. *Far East Journal of Psychology and Business, 2*(2), 54–70.

Aliyar, A. B. (2010). *A study on the efficiency of Islamic economic instruments in selected Islamic countries* (PhD thesis, Cochin University of Science and Technology).

Ameer, P. A. (2013). Finance for the poor: An exploratory study of interest-free microfinance initiative at Kuthiyathode Panchayath, Kerala. *International Journal of Economics, Commerce and Research, 3*(2), 103–116.

Ameer, P. A. (2022). *Evaluating the performance of interest-free microfinance institutions in Kerala: A double bottom line approach* (PhD thesis, Cochin University of Science and Technology).

Arslen, G., & Ergeç, E. H. (2010). The efficiency of participation and conventional banks in Turkey using DEA. *International Research Journal of Finance and Economics, 57*, 156–168.

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management Science, 30*(9), 1078–1092. https://doi.org/10.1287/mnsc.30.9.1078

Ben Soltane, B. (2008). Efficiency of microfinance institutions in the Mediterranean: An application of DEA. *Transition Studies Review, 15*(2), 343–354. https://doi.org/10.1007/s11300-008-0017-6

Borges, M. R., Nektarios, M., & Barros, C. P. (2008). Analysing the efficiency of the Greek life insurance industry. *European Research Studies, 11*(3), 63–79.

Çelik, Ş., & Öncü, E. (2019). Efficiency of participation and conventional banks: Evidence from Turkey. *Journal of Islamic Financial Studies, 5*(2), 58–71. https://doi.org/10.46298/jifs.2019.5.2.58

Chapra, M. U. (1993). *Islam and economic development: A strategy for development with justice and stability*. The International Institute of Islamic Thought.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research, 2*(6), 429–444. https://doi.org/10.1016/0377-2217(78)90138-8

Chen, C. F. (2007). Applying the stochastic frontier approach to measure hotel managerial efficiency in Taiwan. *Tourism Management, 28*(3), 696–702. https://doi.org/10.1016/j.tourman.2006.04.022

El-Gamal, M. A. (2006). *Islamic finance: Law, economics, and practice*. Cambridge University Press.

Gutiérrez-Nieto, B., Serrano-Cinca, C., & Mar Molinero, C. (2007). Microfinance institutions and efficiency. *Omega, 35*(2), 131–142. https://doi.org/10.1016/j.omega.2005.04.001

Hamarat, Ç. (2024). The efficiency of participation and conventional banking in Türkiye: A stochastic frontier approach. *Toplum Ekonomi ve Yönetim Dergisi, 5*(1), 56–79.

Hassan, M. K., et al. (2009). Efficiency of Islamic and conventional banks: Evidence from OIC countries. *Journal of Financial Services Research, 35*(3), 203–226. https://doi.org/10.1007/s10693-008-0054-4

Iqbal, Z., & Mirakhor, A. (2007). *An introduction to Islamic finance: Theory and practice*. Wiley Finance.

Johnes, J., Izzeldin, M., & Pappas, V. (2009). Efficiency of Islamic and conventional banks: A DEA approach. *Journal of Banking and Finance, 33*(3), 497–505. https://doi.org/10.1016/j.jbankfin.2008.08.015

Majid, A. (2010). Efficiency and scale of Islamic banking: A cross-country comparison. *Journal of Islamic Economics, Banking and Finance, 6*(1), 45–62.

Metwally, M. M. (1997). Differences between the financial characteristics of interest-free banks and conventional banks. *European Business Review, 97*(2), 92–98. https://doi.org/10.1108/09555349710162283

Mohammed, W. S., & Waheed, K. (2019). Interest-free microfinance in India: A case study of Bait-un-Nasr Cooperative Credit Society. *ISRA International Journal of Islamic Finance, 11*(2), 322–337. https://doi.org/10.1108/IJIF-11-02-2019-B005

Rusydiana, A. S., & Sanrego, Y. D. (2018). Measuring the performance of Islamic banking in Indonesia: An application of Maslahah-efficiency quadrant. *Journal of Islamic Monetary Economics and Finance, 3*(1), 79–98. https://doi.org/10.21098/jimf.v3i1.872

Samad, A. (2004). Performance of Islamic banks during 1994–2001. *Credit and Financial Management Review, 10*(1), 33–40.

Siddiqi, M. N. (2006). Islamic banking and finance in theory and practice: A survey of state of the art. *Islamic Economic Studies, 13*(2), 1–48.

Sufian, F. (2006). Measuring the efficiency of Islamic banks in Malaysia: DEA approach. *Review of Islamic Economics, 10*(2), 5–26.

Adeel, A. (2017). *Financial performance of Islamic and conventional banking in Pakistan: A comparative study*. International Journal of Current Science and Technology.

Ansari, S., & Rehman, A. (2011). *Financial performance of Islamic and conventional banks in Pakistan* (Unpublished thesis).

Awan, A. G. (2009). Comparison of Islamic and conventional banking in Pakistan. In *Proceedings of 2nd CBRC*, Lahore, Pakistan.

IAEME. (2020). Comparative study: Conventional and Islamic banking performance in Pakistan. *International Journal of Management, 12*(3), 448–459.

IMF. (2008). *Financial stability report: Islamic banking and global crisis*. IMF Publications.

Japonica Intersectoral. (2003). *Microfinance and poverty reduction: A Mediterranean perspective* (Unpublished report).

Khan, M., & Mirakhor, A. (1987). *Theoretical studies in Islamic banking and finance*. IRIS Books.

Latif, M., et al. (2016). *Comparative analysis of Islamic and conventional banks in Pakistan* (Unpublished thesis).

Moin, M. S. (2008). *Performance of Islamic banking and conventional banking in Pakistan: A comparative study* (Unpublished thesis).

Murad, H., et al. (2021). Comparative study: Conventional and Islamic banking performance in Pakistan. *International Journal of Management, 12*(3), 448–459.

Rehman, A. (2011). *Financial performance of Islamic and conventional banks in Pakistan: A comparative study* (Unpublished thesis).

Sakinç, İ., & Gülen, M. (2014). Performance comparison of participation banks in Turkey via grey relational analysis. *Journal of Economic and Social Thought, 1*(1), 3–14.

Shodhganga. (2012). *A study on the efficiency of Islamic economic instruments in selected Islamic countries*. Cochin University of Science and Technology Repository.

Shodhganga. (2022). *Evaluating the performance of interest-free microfinance institutions in Kerala*. Cochin University of Science and Technology Repository.

State Bank of Pakistan. (2020). *Islamic banking bulletin*. SBP Publications.

UKM. (2009). *Islamic economics system: From principles to microeconomics and macroeconomics* (Working Paper).

Yasir, M. (2012). *Financial performance analysis of Islamic and conventional banks in Pakistan: A comparative study* (Unpublished thesis).