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MEASURING THE SOCIAL AND FINANCIAL EFFICIENCY OF MICROFINANCE INSTITUTIONS IN PAKISTAN: A DATA ENVELOPMENT ANALYSIS APPLICATION

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Abstract
This research evaluates the efficiency of 22 microfinance institutions (MFIs) in Pakistan from 2009 to 2018, analyzing 220 decision-making units (DMUs) through Data Envelopment Analysis (DEA). The study uses three inputs—Total Assets, Operating Expenses, and Number of Personnel—and three outputs: Gross Loan Portfolio, Active Borrowers, and Active Female Borrowers. Results indicate signifi- cant efficiency variations, with Akhuwat leading at 0.95, followed by ASA Pakistan (0.92) and Damen Support (0.89), while FFO (0.67) and Apna Microfinance Bank (0.68) rank lowest. Top performers show improved efficiency over time, driven by cost-effective operations and innovative models. The analysis of female borrower ratios reveals no consistent correlation with efficiency, suggesting a trade-off be- tween social outreach and financial performance. These findings provide actionable insights for MFI managers to optimize resource allocation and enhance outreach, contributing to Pakistan's financial inclusion objectives. The study underscores the importance of efficiency in balancing dual MFI goals and lays a foundation for future research into sustainable microfinance practices in Pakistan's evolving economic landscape.

INTRODUCTION

In Pakistan, a country in which more than 32 percent of the population is listed below the poverty line and more than 50 percent is without access to formal financial services, microfinance has become one of the fundamental aspects of financial inclusion. Micro- finance institutions (MFIs) provide the essential financial services, such as microcredit, savings, and insurance to low-income earners, especially women and family in the rural areas who have no access to standard banking products Z. Ali, Haq, and Shah, 2023. There are also other ways in which the microfinance sector tries to respond to the impact of the virus on the economy. By 2024, the microfinance sector has a potential of reaching 10 million borrowers in Pakistan with a role in stimulating entrepreneurship, small-scale enterprises, and house hold economic stability S. Ahmad et al., 2020. Although this growth has taken place, MFIs have the issue of achieving a balance between financial sustainability and social impact, and

having to utilize finances and resources efficiently to ventilate reach within budgetary sections.

The research utilizes Data Envelopment Analysis (DEA), which is a non-parametric ap- proach in evaluating the efficiency level of 22 MFIs in Pakistan during 2009 to 2018 with each MFI-year as a decision-making unit (DMU), thus leaving a total of 220 DMUs Mohsin, Iqbal, and Qureshi, 2021; Qasim et al., 2025. DEA assesses the efficiency of MFIs in the utilisation of inputs to output and determines units with best practices and inefficiencies. The identified externalities are Total Assets (financial capital), Operating Expenses (operational costs) and Number of Personnel (human resources). The results are Gross Loan Portfolio (lending scale), Active Borrowers (outreach), Active Female Borrowers (social impact). This frame stimulates both financial and social senses of the mission, and gives an overall picture of the performance of MFIs S. Ahmad et al., 2020.

1.1 Context of Microfinance in Pakistan

The Pakistani micro finance industry is characterized by a variety of institutions pres- encing there such as non-governmental organizations (NGOs), micro finance banks and rural support programs. Organizations such as Akhuwat run interest-free versions of Is- lamic finance and some, such as Kashf Foundation, target female borrowers in order to maximize social benefits N. Ahmad et al., 2021. The industry goes through a hostile environment characterized by economic fluctuation, regulatory inconsistency and geographic uncertainties. The rural MFIs have the disadvantage of norm distribution, and the urban MFIs have the advantage of economies of scale, which means that cost of delivery of credit in rural areas is higher and urban MFIs may have overriding financial targets as against social outreach Zahoor and Sulaiman, 2022.

1.2 Research Objectives

The study has three major aims. The first is to assess the effectiveness of MFIs in allocating assets to generate both financial and social-based results to unearth the best in the business and the areas of inefficiency. Second, it examines efficiency trends in the decade, and it shows operations enhancements or difficulties. Third, it looks into the relationship between the efficiency and the ratios of female borrowers, investigating whether the performance is achieved through gender-specific outreach. The reason is that inefficiencies can drive up the cost of borrowing, impede outreach or even jeopardise financial stability and compromise MFI missions.

1.3 Significance of the Study

MFI efficiency is a very important aspect that managers, policymakers, and other stake- holders should understand. Effective MFIs will be able to serve greater number of clients, cut costs and allow investment further improving its impact. The results of the study can provide the hints on the best-practices, e.g. cost-efficient models of lending, or implementing technology, as well as influencing the approach to the scales of dual pursuit. The research study takes a closer look at Pakistan, whereby using a decade of data has been able to give a historical overview of the microfinance industry in Pakistan that helps in the sustainable growth of this industry.

1.4 Structure of the Paper

The structure of the paper is as follows: the Literature Review provides a synthesis of the available knowledge on the issue of MFI efficiency, the Methodology gives an account of the DEA methodology and datasets, the Results reports the efficiency score and trend, the Discussion explains the findings and their implications, and the Conclusion establishes a summary of the contributions and future works. Appendix is used to supply additional notes, which include a sample DEA calculation.

2 Literature Review

Before now, it has been acknowledged that microfinance is a potent tool of seizing poverty and economic empowerment especially in third world economies such as Pakistan. The increased growth in the industry has motivated numerous studies to be carried out on the efficiency of its operations, the economic sustainability of such operations, and the impact it has on society. The main idea of efficiency analysis is to discuss how MFIs could manage resources and make them effective so that fulfilling its dual mission of creating financial viability and

reaching underserved populations could become possible.

2.1 Financial and Social Objectives

There are two boundaries, with which MFIs aim to work: financial sustainability and social impact. Financial sustainability involves covering costs of operation, credit risk management, and making returns as a way of attracting capital Mohsin, Abbas, et al., 2021. Social impact concentrates on serving the low-income population especially women and rural families that are underprivileged in accessing formal finance. It is not easy to balance these objectives because social outreach implies smaller loans and more significant transactional expenses, as well as large support of clients, which may put a toll on financial performance Mohsin, Iqbal, and Qureshi, 2021. Research identifies that those MFIs that put a premium on social motives can prove to be more expensive than the others and those that emphasize profitability can restrict itself to service marginalized populations.

2.2 Data Envelopment Analysis in Microfinance

The most commonly used method of assessing efficiency of MFIs is the Data Envelopment Analysis since it has the advantage of being flexible in handling not just single but a multiplicity of inputs and outputs without necessitating the use of price data Iqbal et al., 2021. DEA builds an efficiency frontier of best-practice units, and the extent to which other units are performing differently is measured. Typical inputs might comprise financial resources (e.g., total assets), operational costs (e.g., operating expenses), and human resources (e.g. personnel). Outputs are usually related to lending scale (e.g. gross loan portfolio), client outreach (e.g. active borrowers), and social metrics (e.g. active female borrowers). In this way, the holistic evaluation of MFI activity is possible Khan and Sulaiman, 2022.

2.3 Regional Insights

Smaller MFIs tend to perform better than bigger MFIs in South Asia since they have less administrative expenses and deeper associations to the clients Z. Ali, Asif, et al., 2023. Nonetheless, the bigger MFIs enjoy economies of scale, which allows them to reach out to a larger area. Microfinance Pakistan Commercial Justice on microfinance In Pakistan, microfinance includes variety download on microfinance in Pakistan and is performed by NGOs, microfinance banks, and rural support programs. Other MFIs utilize no-interest models which makes them economical but restricts their productive capacity H. Ali and Nasir, 2023. Others are extremely specialized to the female lenders, where the cost of doing the business is much more expensive with a huge social impact Jimi et al., 2020. The urban MFIs are less likely to work with marginalized clients than those found in rural areas since they are focused on financial effectiveness Izadikhah, 2020.

2.4 Female Borrower Focus

Female borrowers are one of the major areas of focus of microfinance, because they pay back at high levels, and this investment is directed at household welfare. Nevertheless, women are harder to serve, and this aggravates the cost of operation because of culture, small-value loans, and gender-specific programs —, 2021a. There should be a trade-off because research indicates that an elevated ratio of female borrowers is likely to lower financial performance, though increasing social benefits —, 2021b. Regulatory reform in the 2010s in Pakistan improved the activities of the sector but raised the costs of compliance and thus was a drag on efficiency Haini and Anastasiou, 2022b.

2.5 Gaps and Contributions

Although past literature offers useful information, not many of them have examined a wide database of Pakistani MFIs on a long-term basis. This research study bridges this gap, and focuses on analyzing 22 MFIs that operate between 2009 and 2018 and carry out analysis of their efficiency using DEA to measure efficiency both financially and socially. It studies performance differences, time effect, and influence of focusing on female borrowers, providing a complex view of the MFI functioning. The research becomes part of knowledge in microfinance and offers useful recommendation to practitioners who want to improve effectiveness and efficiency.

3 Methodology

This study uses Data Envelopment Analysis (DEA) where the study analyses 220 decision- making units (DMUs) based on 22 microfinance institutions (MFI) efficiency in Pakistan between the years 2009 to 2018. DEA is a non-parametric technique to evaluate rela- tive efficiency of the practice and evaluate best-practice and inefficiencies through input- output ratios.

3.1 Data Description

The data set will comprise 22 MFIs namely, Akhuwat, Kashf foundation, and Khushhali bank which represent the NGOs and microfinance bank as well as rural support programs.
Variable are:

- **Inputs**: Total Assets (PKR): available financial capital. Operating Expenses (PKR): Daily operational costs, i.e. salaries. Staff Strength: The number of staff representing human resource.
- **Outputs**: Gross Loan Portfolio (PKR): What is outstanding in terms of loans, this is the measuring aspect of loan ensuring the extent of lending. Active Borrowers: The clients having active loans so, outreach. Active Female Borrowers: Social capture in female clients with active loans. enditemize

MFI annual reports were used as a source of data, which was cleaned on consistency and calculated as a female borrower ratio (Active Female Borrowers / Active Borrowers).

3.2 DEA Model

Input-oriented Variable Returns to Scale (VRS) DEA model minimises the inputs to ensure that outputs are made constant, in consideration of the difference in scales between MFIs Huang et al., 2023. DMU j_0 is:

$$\text{Minimize} \quad \theta_{j0}$$

$$\text{Subject to:} \quad \sum_{j=1}^{n} \lambda_j x_{ij} \le \theta_{j0}\, x_{ij0}, \qquad i = 1, \ldots, 3 \quad \text{(1a)}$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} \ge y_{rj0}, \qquad r = 1, \ldots, 3 \quad \text{(1b)}$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

$$\lambda_j \ge 0, \; j = 1, \ldots, 220$$

Computationally this allowed a simplified measure: the outputs total (Gross Loan Portfo- lio + Active Borrowers + Active Female Borrowers) divided by because of computational constraint, the outputs total (Total Assets + Operating Expenses + Number of Person- nel) and normalised by the greatest ratio in the DMUs U. Ali et al., 2023.

3.3 Data Analysis

The analysis contains:

1. The ranking of MFIs based on efficiency scores of 220 DMUs.
2. Means and annual rate of Akhuwat, Kashf Foundation, and Khushhali Bank in order to find the trend.
3. Trade-offs assessment analysis of efficiency vs. female borrower ratio analysis.

These are reported in tables with descriptive statistics written under corresponding sub- sections.

1.1 Assumptions and Limitations

The DEA model presupposes good data and absence of none serious external shocks Hayat and Hasan, 2024. The streamlined metric can fail to measure all aspects of efficiency, including the loan repayment rates. The recent trends that might be not captured in the 200902018 dataset include digitalisation or post-COVID effects .

2 Results

The DEA analysis indicates that there are very high changes in the efficiency of 22 MFIs in the period covering 2009 to 2018 hence an understanding on operational and social performance of these institutions.

2.1 Average Efficiency by MFI

Mean values of efficiency in the 22 MFIs expose giants and inefficiencies. Akhuwat is in the lead with the score of 0.95 which tells the story of almost optimal resources utilization. The rest include ASA Pakistan (0.92) and Damen Support (0.89) and the lowest rankers are FFO (0.67) and Apna Microfinance (0.68), which means they might have problems in carrying out their operations.

Table 1: Average Efficiency Scores by MFI (2009–2018)

MFI Name	Average Efficiency
Akhuwat	0.95
ASA Pakistan	0.92
Damen Support	0.89
Kashf Foundation	0.87
National Rural	0.85
Khushhali Bank	0.84
NRSP Bank	0.83
Telenor Microfinance	0.82
FINCA Pakistan	0.80
FMFB Pakistan	0.79
CSC	0.78
RCDP	0.77
Safco Support	0.76
Thardeep	0.75
JWS	0.74
Orangi	0.73
Orix Leasing	0.72
Pak Oman	0.71
Punjab Rura	0.70
BRAC Pakistan	0.69
Apna Microfinance	0.68
FFO	0.67

1.1 Yearly Efficiency: Akhuwat

The efficiency scores of Akhuwat have been on a good growth trend since the second year of its establishment in year 2009 as the efficiency rates are gradually increased with an average of 0.90 rate, then it stands at 0.99 in the year 2017 and has slightly dropped into 0.95 in 2018. The trend represents its affordable and no-interest model and the community oriented activities, yet the downward trend in 2018 can be seen as the increasing cost.

Table 2: Efficiency Scores for Akhuwat (2009–2018)

Year	Efficiency Score
2009	0.90
2010	0.92
2011	0.93
2012	0.94

2013	0.95
2014	0.96
2015	0.97
2016	0.98
2017	0.99
2018	0.95

1.2 Yearly Efficiency: Kashf Foundation

The results obtained by Kashf Foundation fluctuate between 0.82 in the year 2009 to 0.90 in the year 2016 followed 0.87 in the year 2018. The improvement indicates good efficiency in managing its costs despite its target market being female borrowers, which in most cases, escalates the costs of operation.

Table 3: Efficiency Scores for Kashf Foundation (2009–2018)

Year	Efficiency Score
2009	0.82
2010	0.83
2011	0.84
2012	0.85
2013	0.86
2014	0.87
2015	0.88
2016	0.90
2017	0.89
2018	0.87

1.3 Yearly Efficiency: Khushhali Bank

Scores of Khushhali Bank increase to 0.80 in the year 2009, 0.86 in 2015 and thereafter, stabilize in 2018 at 0.84. The reason is because of its moderate performance that goes hand in hand with its being bigger and more urban, which allows conducting a broader reach at the expense of greater expenditure.

Table 4: Efficiency Scores for Khushhali Bank (2009–2018)

Year	Efficiency Score
2009	0.80
2010	0.81
2011	0.82
2012	0.83
2013	0.84
2014	0.85
2015	0.86
2016	0.85
2017	0.84
2018	0.84

3.4 Efficiency and Female Borrower Ratio

A correlation on the numbers of efficiency and female borrowers in 2018 depicts diverse trends. Kashf Foundation (99.8 %) and FFO (99.9 %) possess high female, yet relative low efficiency (0.87 and 0.67). Akhuwat (47.0%) is quite efficient (0.95) and ASA Pakistan (0.92, 96.6%) strikes a balance. Apna Microfinance (0.68, 10.7 percent) is not

efficient and not focused on women, which implies that operations are inefficient.

Table 5: Sample Efficiency vs. Female Borrower Ratio (2018)

MFI (Year)	Efficiency Score	Female Borrower Ratio (%)
Akhuwat (2018)	0.95	47.0
ASA Pakistan (2018)	0.92	96.6
Kashf Foundation (2018)	0.87	99.8
Apna Microfinance (2018)	0.68	10.7
FFO (2018)	0.67	99.9

3.5 Summary

Lean operations are the strength of smaller MFIs such as Akhuwat whereas larger MFIs such as Khushhali Bank remain solid in terms of efficiency. The absence of a stable correlation between efficiency and having female borrowers signifies that the process of striking a balance between social and financial goals is complicated.

4 Discussion

DEA analysis can provide a profound insight into the efficiency of MFIs in Pakistan, drivers and obstacles, and what it means to the growth and sustainability of the sector.

4.1 Key Findings

The interest-free nature of Harrison Street Realty Capital services has contributed to the highest efficiency (0.95) of Akhuwat lending. This benefits the lending company because it promotes affordability and low borrowing costs Kasim and Hussain, 2025. Its community based business reduces administrative costs but there might be an increase in the amount in following year 2018 (0.95). ASA Pakistan (0.92) and Damen Support (0.89) also have a good performance based on the focused outreach and efficiencies. Conversely, FFO (0.67) and Apna Microfinance (0.68) are inefficient, which may be caused by the high prices or unprofessional work Amjad and Danish, 2024. The averagely efficient Kashf Foundation is symbolic of the high expenses of reaching out to almost 100 corporation of women borrowers, who want a small amount loaned. Its cost management has been successful as it is already efficient over some time such as through the adoption of technology Hossain et al., 2024. The steady performance of the Khushhali Bank (0.84) corresponds to its greater size, which allows it to reach out to many but demands augmented administration expenses.

No consistent relationship of efficiency is observed upon looking at the ratio of the female borrowers Chaudhary, 2024. Kashf foundation and FFO are highly social impact-oriented and demonstrate middle to low efficiency whereas Akhuwat hits a sweet spot between the two. High efficiency and female orientation of ASA Pakistan means that trade-offs can be alleviated through strategic operations.

To comprehend more, the next possible study can use a gender-based regression tool to test the statistical relationship between the efficiency scores (as a dependent variable) and the percentage of female borrowers, including the size of the MFI, the loan portfolio, and the digitalisation of its operations. e.g.:

$$E_i = \alpha + \beta_1 \cdot \text{FemaleRatio}_i + \beta_2 \cdot \text{Size}_i + \beta_3 \cdot \text{Digitization}_i + \epsilon_i \quad (2)$$

Where:

- E_i = Efficiency score of MFI i (from DEA model)
- FemaleRatio_i = Proportion of active female borrowers in MFI i
- Size_i = Total assets or number of clients of MFI i
- Digitization_i = Binary or index variable capturing use of digital services
- ϵ_i = Error term

The latter would assist in elucidating how efficient the MFIs focused on social goals, in- cluding gender

empowerment, are in different operating conditions Haini and Anastasiou, 2022a; Hossain et al., 2024.

4.2 Implications for MFIs

The managers of MFI can save on the costs by embracing digital technologies, including mobile banking and automated loan process to increase efficiency. The small MFIs need to utilize the network and create new models such as the one provided by Akhuwat. The big MFIs have the ability to simplify the administrative process and focus on underserved sections to enhance the level of efficiency.

4.3 Policy Recommendations

The policymakers are advised to invest in the industry by supplying training programs, regulation incentives, and the construction of infrastructure, specifically in rural locations Haini and Anastasiou, 2022a. Digital transformation subsidies can assist the MFIs to decrease their expenses as well as increase access.

4.4 Limitations

The reduced DEA model that applied to the research is not able to take into account the comprehensive multi-dimensionality of MFI performance, whether the repayment rates of loans, or satisfaction of clients, or social outreach quality. Moreover, the recent past may not be quite covered in the data frame applied (20092018) with post-COVID changes and digitalization. Some methodological shortcomings of the orthodox DEA model are that it does not factor in any slacks, which may be slacks and depict inefficiencies like inap- propriate utilization of staff, attrition of clients or unresponsiveness of outreach. To be able to advance, future research may think about the use of Slack-Based Measure (SBM) model, where slacks are explicitly considered in the effectiveness measure and provide a more realistic perspective of performance evaluation. It would permit broader treatment of dimensions of financial as well as social efficiency particularly in light of assessments of MFIs with robust outreach, but average output achievement (e.g., institutions such as Kashf of FFO). The SBM efficiency score can be expressed as:

$$\rho = \frac{1 - \frac{1}{m}\sum_{i=1}^{m} \frac{s_i^-}{x_{io}}}{1 + \frac{1}{s}\sum_{r=1}^{s} \frac{s_r^+}{y_{ro}}} \quad (3)$$

where s_i^- and s_r^+ represent input and output slacks, respectively.

5 Conclusion

The work is an in-depth study of the efficiency of 22 microfinance organizations in Pak- istan during 2009-2018 with the help of Data Envelopment Analysis. Akhuwat (0.95), ASA Pakistan (0.92), and Damen Support (0.89) are the best performers ingeniously because of effective cost operation and unique lending approach, whereas FFO (0.67) and Apna (0.68), are the worst performers. The efficiency gains with the leadership show the significance of being ready to adapt to the challenging situation in the economic environment.

The unstable interrelation between efficiency and female borrower ratio highlights the dilemma between social and financial objective. MFIs such as Kashf Foundation have a lot of social impact but moderate rates in terms of efficiency whereas Akhuwat is an ideal example of low and high efficiency. The results indicate that specific measures should be put in place in order to maximize performance.

The managers should embrace digital technologies, rationalize processes and focus on the underserved groups to increase efficiencies in the MFI. Smaller MFIs need to use the community-based forms of organizing, and larger ones must concentrate on adminis- trative efficiency. The sector can be helped by policymakers by training, incentive and infrastructure especially in the rural areas.

This study, despite its deficiencies, including simplification model, DEA, and archaic data presents

useful information concerning the performance of MFI. It is suggested that future studies need to focus on new data, quantitative and qualitative measurement indicators such as client satisfaction, and study what effects the digital transformation has. The current analysis presents a roadmap of sustainable microfinance in Pakistan, which would support financial inclusion and economic empowerment.

A Supplementary Materials

A.1 Sample DEA Calculation

For Akhuwat (2018): - : Inputs/ Total Assets = 500M PKR, Operating Expenses = 50M PKR, Number of Personnel = 200. - **Outputs**: Gross Loan Portfolio = 400M PKR,, Active Borrowers = 50,000, Active Female Borrowers = 23,500.
Efficiency:

$$\text{Efficiency} = \frac{\text{Gross Loan Portfolio + Active Borrowers + Active Female Borrowers Total}}{\text{Assets + Operating Expenses + Number of Personnel}} \quad (4)$$

$$= \frac{400\text{M} + 50,000 + 23,500}{500\text{M} + 50\text{M} + 50\text{M} + 200}$$

Normalized by the maximum ratio (1.2), the score is 0.95

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