Working Paper No. 19

Efficiency of Microfinance Institutions in Bangladesh

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September 2013

Institute of Microfinance (InM)

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The paper is an outcome of an InM research study entitled "The Impact of Governance Mechanism on Performance and Outreach of Microfinance Institutions in Bangladesh". The authors are grateful to DFID's PROSPER (Promoting Financial Services for Poverty Reduction) Programme for providing funds for the study. However, the views expressed in this paper are entirely those of the authors and do not necessarily reflect the views of InM, DFID, or any other affiliated organisations.

Abstract

This study presents an empirical analysis of the cost efficiency of a sample of microfinance institutions (MFIs) operating in Bangladesh. These MFIs substantially vary in size and can also be characterised by their affiliation with donor and funding agencies. Therefore, the measurement of their performance poses an important challenge for the donor agencies and policymakers. Using stochastic frontier models in the measurement of the level of efficiency for the MFIs, the study suggests that larger MFIs are more efficient with some evidence of a trade-off between efficiency and outreach.

1. Introduction

Microcredit has emerged as a feasible financial alternative for poor people with no access to credit from formal financial institutions, in an attempt to ameliorate poverty by fostering small scale entrepreneurship through simple access to credit. It distinguishes itself from formal credit by disbursing microcredit or small loans to the poor, using various innovative non-traditional loan configurations such as loans without collateral, group lending, progressive loan structure, immediate repayment arrangements, regular repayment schedules, and collateral substitutes. The operational and institutional framework of a typical microfinance institution (MFI) is substantially different from that of a formal financial institution, such as a typical commercial bank. Most MFIs do not rely on deposits as their primary source of funds, and in addition to disbursing microcredit; they also provide non-credit services such as capacity building, marketing of products, vocational training, and information on civil rights and health to their borrowers. On the hand, the MFIs do not operate like the government supported development banks that simply focus on the volume of credit disbursement in a particular sector of the economy such as agriculture, and practice a market approach to credit and attempt to operate on the basis of self-sustainability, unlike their development bank counterparts. However, there has been a recent tendency among some MFIs to restructure themselves as commercial enterprises to be able to tap into deposits as a source of funds.

In Bangladesh and throughout many developing countries, microfinance institutions (MFIs) provide financial services to women, small scale entrepreneurs, and landless farmers. An analysis of the performance of these MFIs is significant given that a large fraction of the population are microcredit recipients (or prospective borrowers) and that facilities of the formal banking sector are inadequate in fully serve this clientele. Furthermore, there is a dearth of aggregated information available about these MFIs and it is important for donors, practitioners and policymakers to understand which types of institutional features contribute to the efficiency of the firms. Efficiency of MFIs is a relevant issue to examine since under-performing institutions may be forced to exit the market, while measures of efficiency can identify which types of MFIs should be fostered in this rapidly expanding semi-formal financial sector. This semi-formal microcredit financial sector consists of markedly heterogeneous MFIs, and very little is known about the relative efficiency of these institutions and the determinants of efficiency thereof.

Efficiency frontier techniques are generally applied to formal banks in developed countries and are well established in the banking literature. However, these techniques have been sparingly used to estimate the relative efficiency of semi-formal financial institutions in developing countries. Initially the stochastic frontier model was introduced in the context of production function estimation to account for the effect of technical inefficiency. Such technical inefficiency may result in actual output to fall below the potential output level indicating being in the interior of the production possibility frontier. When modelling the estimation of a cost function such inefficiency may result in raising the cost of production above the cost frontier or the minimum level. Recent applications of the stochastic frontier model in analysing formal financial institutions in developed countries can be extended to the evaluation of the technical efficiency of semiformal financial institutions, such as microfinance institutions(MFIs) operating in developing countries. The non-monotonic parameterisation of exogenous determinants of technical efficiency in the stochastic frontier analysis is useful for the analysis of the MFIs because the marginal effects of certain determinants of technical efficiency. While the literature on borrowers of microcredit is quite large, there has been a dearth of studies analysing the performance of microfinance institutions in Bangladesh. This analysis uses stochastic frontier analysis to analyse the technical efficiency of MFIs in Bangladesh. The empirical results highlight various challenges that lie ahead as the MFIs strive to provide financial services to the rural and urban areas in Bangladesh.

Section 2 of this paper presents an overview of the efficiency of financial institutions. Section 3 briefly discusses the state of the microcredit sector in Bangladesh while Section 4 describes the data and the variables used in our study. Section 5 presents the econometric model of frontier analysis and Section 6 provides a narrative of the empirical results for the frontier model and technical efficiency. Finally, a summary of important findings and conclusion is offered in Section 7.

2. Efficiency of a Financial Institution

The concept of efficiency is intricately related to measuring the performance of financial institutions. In general, the concept of efficiency relates to quantities and costs of inputs and outputs. A firm is efficient if it is able to maximise the quantity of an output for given quantity of inputs, or in other words, it can operate at the lowest cost of inputs for a given quantity of output. Efficiency is not a novel concept in the microcredit industry. The Microfinance Consensus Guidelines (CGAP, 2003) provides donors and MFI practitioners with a common framework for measuring performance. These guidelines include nine ratios for measuring efficiency and productivity. The most commonly used efficiency indicator for MFIs is operating expense divided by average gross loan portfolio or total assets.

In a survey of empirical studies, Berger and Humphrey (1997) present findings from 116 technical efficiency analyses which calculate efficiency scores from either cost functions or production functions, where a unitary efficiency score indicates that the institution is on the efficient frontier and is merely a reflection of the most efficient institutions within a given data set. Since efficiency scores are based only in comparison with other banks in the data set, it is difficult to compare absolute numbers across data sets and make relative comparisons they do provide some indication of typical efficiency scores and the extent of variation among efficiency scores. Shanmugam (2004) and Weill (2003) find that foreign-owned commercial banks are more efficient than both nationalised and private domestic banks in developing economies and countries with transition economies. Taylor *et al*. (1997) apply Data Envelope Analysis to panel data from 1989 to 1991 for 13 Mexican commercial banks and find that the average bank had an efficiency score of 0.72. The results indicate that banks could increase their technical efficiency relative to their competitors over time by shifting their input mix. The authors find that while there is a weak positive relationship between profitability and efficiency. Using a sample of 350 semi-formal financial institutions from Mexico (Paxton, 2006), the primary determinants of efficiency are found to be institutional factors rather than client profiles.

Despite the advantages of imposing no functional form on the efficiency frontier, the assumption of no random error is problematic. Parametric methodologies, particularly SFA, are increasingly becoming the predominant estimation technique for banking efficiency. Incorporating an error term is particularly desirable when analysing data from developing countries that may contain measurement error and accounting irregularities.

3. Microcredit in Bangladesh

Microcredit formally started in 1976 and went through a rapid growth since the mid-eighties. Starting in the 1970s, experimental programmes in Bangladesh, Brazil, and a few other Latin American countries disbursed small loans to groups of poor women to invest in indigenous home-based businesses. This type of microcredit was based on solidarity group lending in which each member of a group guaranteed the repayment by all members. These programmes had an almost exclusive focus on credit for income generating activities accompanied by mandated savings mechanisms targeting the ultra-poor borrowers who are mostly women. This study is an attempt to analyse the efficiency of the MFIs in Bangladesh suing a non-parametric approach.

According to the Microcredit Regulatory Authority (MRA) of Bangladesh, there are more than 4000 MFIs currently operating in Bangladesh. However, 90 per cent of total lending in carried out by only ten MFIs. The microcredit industry in exhibits a wide variation in the ownership structure of MFIs, emphasis of their lending profile, nature of outreach to the poor, and their overall financial performance. Microcredit programme in Bangladesh is implemented by NGOs, Grameen Bank, different types of government-owned banks, private commercial banks, and specialised programmes of some ministries of Bangladesh Government, etc. Despite the fact that more than a thousand of institutions are operating microcredit programmes, only 10 large MFIs and Grameen Bank represent 87 per cent of total savings of the sector and 81 per cent of total outstanding loan of the sector. The sector employs approximately two hundred thousand people in various MFIs including Grameen Bank. More than 30 million poor people have borrowed and have directly benefited from microcredit programmes. Through the financial services of microcredit, these poor people are engaging themselves in various income generating activities. By the end of 2009, a total of approximately 160 billion taka has been disbursed among the poor people, and this credit has helped them to be self-employed facilitating the overall economic development process of the country.

From Table 1 we observe that the number of members (borrowers) and the amount of loan outstanding have steadily increased over the four-year period covered in our study, for each and every category of MFIs. Not counting the very large MFIs, in general, large MFIs seem to be operationally more efficient as their break even interest rate is lower than the small and medium MFIs, without having to charging a higher rate of interest on their loans. There is a general tendency for the average lending rate and the cost per taka loan to have declined over this time period. This indicates some learning in the context of efficiency as the microcredit sector expands and MFIs expand their operation over time.

Table 1
Descriptive Statistics

	Small	Medium	Large	Very Large	Grameen Bank
2004					
Total Members	2680	6261	74066	3927712	4059632
Loans Outstanding	81.61	308.15	2010.62	124015.65	208463.68
Lending Rate	23.1	28.66	23.96	42.78	18.48
Cost per Taka Loan	0.3412	0.2697	1.3227	0.4389	0.0802
Profit	-0.71	20.77	133.85	15533.24	4221.27
Break Even Interest Rate	0.338	0.3213	0.2075	0.8379	0.0888
2005					
Total Members	4264	18269	164281	5473038	5579399
Loans Outstanding	111.11	453.24	2973.42	164782.3	288967.59
Lending Rate	22.76	27.01	126.59	30.19	19
Cost per Taka Loan	0.3684	1.334	0.8486	0.403	0.0823
Profit	12.29	-1225.97	159.06	23339.39	10004.42
Break Even Interest Rate	0.3914	1.5506	1.1801	0.4497	0.0957
2006					
Total Members	4999	21253	171054	5831561	6908704
Loans Outstanding	167.37	678.68	4666.59	215663.29	341448.97
Lending Rate	20.58	24.55	22.73	30.36	20.1
Cost per Taka Loan	0.1888	0.272	0.1949	0.3475	0.0872
Profit	6.01	34.09	204.05	29025.27	13981.55
Break Even Interest Rate	0.2209	0.3113	0.206	0.3986	0.0945
2007					
Total Members	5439	24010	187101	7015424	7411229
Loans Outstanding	290.21	1079.69	6639.3	289606.06	375464.8
Lending Rate	20.81	25.09	28.39	27.37	18.94
Cost per Taka Loan	0.1907	0.3459	0.2018	0.3044	0.098
Profit	8.77	48.9	286.83	21151.72	1069.14
Break Even Interest Rate	0.2235	0.3395	0.2471	0.3578	0.1026

Notes: Monetary amounts are in Million Taka.

Sources: InM data set and Authors' own calculation.

Table 2
PKSF Partners and Non-Partners

	PKSF Partners	Non-Partners	PKSF Partners	Non-Partners
	2004		2005	
Total Members	74064	493760	150313	568671
Loans Outstanding	1972.91	17422.5	2804.87	24418.03
Lending Rate	25.11	30.99	.23.26	184.64
Cost per Taka Loan	0.2027	2.0305	0.7654	1.7082
Profit	293.11	701.59	-364.29	1481.46
Break Even Interest Rate	0.2326	0.586	0.8983	2.1395
	2006		2007	
Total Members	196111	547400	270491	751141
Loans Outstanding	6169.26	28831.61	8360.76	37867.97
Lending Rate	21.75	34.01	23.77	35.43
Cost per Taka Loan	0.1791	0.5992	0.1557	1.2174
Profit	701.09	1053.42	534.42	319.37
Break Even Interest Rate	0.2071	0.6728	0.1937	1.136

Notes: Monetary amounts are in Million Taka.
Sources: InM data set and Authors' own calculation.

PKSF is an apex organisation that channels funds from donor agencies to its partner organisations. PKSF partner organisations borrow from PKSF, often at subsidised rates, and are also subject to certain terms and conditions that include increased disclosure requirements and stricter adherence to PKSF guidelines. It is quite evident from Table 2 that while PKSF partners charge a lower lending rate than non-partners in our sample on an average, they also have a lower break-even rate of interest than the non-partners. Evidently, PKSF partners appear to be running their operations more efficiently than their non-partner counterparts.

4. Data and Variables

The data was compiled by the staff at the Institute of Microfinance (InM), who collected information from existing copies of financial statements at the disposal of libraries at InM and PKSF and from solicited financial statements and balance sheets from various MFIs. There are 89 MFIs in our sample.

The dependent variable cost (C) in our estimation of the cost function is represented by total expenditure of an MFI. The primary output of an MFI is its loans (LN) while other assets (OS) which includes cash in hand, fixed deposits, and other assets, constitutes as the secondary output. Price of labour (PL) or the average cost of employees represents one of the input prices. Cost of capital, the other input price is divided into two parts – cost of borrowed funds (CB) and cost of deposits (CD). As is customary, fixed inputs (FI) are included in the cost function as netputs.

Experience in operation should result in increased efficiency and as a result age (AGE) of an MFI is expected to reduce inefficiency. Initial perusal of descriptive statistics shows some variation in breakeven interest rates across small, medium, and large MFIs, and we expect larger MFIs to have higher efficiency due to economy of scale and greater scope in diversifying their portfolio. Size (SZ) of an MFI is measured by the total number of its members. Whereas some initial studies found evidence of a trade-off between outreach and financial performance, more recent studies show that greater depth of outreach can actually reinforce the performance of an MFI, primarily due to higher repayment rates of small borrowers. We expect outreach, measured by average loan balance (ALB), will either contribute towards reduction or an increase in inefficiency of an MFI. Finally, we believe PKSF has a positive impact on its partners and hence greater borrowing (PKS) from PKSF should result in reducing an MFI's inefficiency. The motivation behind using the amount of PKSF borrowing instead of simply using a dummy variable for PKSF partners is to also capture any subsidy effect of PKSF lending.

5. Econometric Model

A stochastic cost frontier model estimates a frontier model using output and input price information utilising econometric methods. The zone below the cost frontier is unattainable; therefore all productive units are either on or above the frontier. Those on the frontier have the lowest cost for a given level of output, and those that lie above the frontier have a higher cost for a given level of output. Therefore, this is the frontier of efficiency or frontier of "best practices", since the units operating on the frontier have "best practice" management procedures.

The econometric frontier model estimates the frontier and measures the distance between the inefficient units and the frontier by the residuals, which is an intuitive approach adopted in traditional econometrics. However, when we assume that the residual has two components (noise and inefficiency) we have the stochastic frontier model. Therefore, the primary issue in econometric frontier models is the decomposition of the error terms.

Recent studies use techniques to estimate an efficient frontier are based on the pioneering work of Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977) who independently introduced the stochastic production or cost frontier models. The frontier estimation in Stata fits three stochastic frontier models with distinct parameterisations of the inefficiency term and can fit the stochastic production or cost frontier models.

We, with a producer, have a production function $f(z_i, \beta)$, such that the production characterised by efficiency, the ith firm would produce:

$$q_i = f(z_i, \beta) \tag{1}$$

where q is the scalar output of firm i, z_i is the vector of N inputs used by producer i, $f(z_i, \beta)$ is the production frontier and β is the vector of technology parameters to be estimated.

Stochastic frontier analysis assumes that due to the degree of in efficiency, each firm potentially produces less than it is ideally capable of producing. Specifically, we can write the above equation as:

$$q_i = f(z_i, \beta)\xi_i \tag{2}$$

Where ξ_i is the level of efficiency for firm i; ξ_i must be in the interval (0,1). If $\xi_i = 1$, the firm is achieving the optimal output with the technology embodied in the production function $f(z_i, \beta)$. When $\xi_i < 1$, the firm is not making the most of the inputs z_i given the technology embodied in the production function $f(z_i, \beta)$. Since the output is assumed to be strictly positive (i.e. ,$q_i > 0$), the degree of technical efficiency is assumed to be strictly positive (i.e. $\xi_i > 0$).

Output is also assumed to be subject to the random shocks, implying that:

$$q_i = f(z_i, \beta)\xi_i \exp(\nu_i) \quad (3)$$

where ν_i is the one-sided disturbance term used to represent cost inefficiency.

Taking the natural logarithm of both sides' yields:

$$\ln(q_i) = \ln\{f(z_i, \beta)\} + \ln\{\xi_i\} + \nu_i \quad (4)$$

Assuming there are k inputs and that the production function is linear in logs, defining $u_i = -\ln(\xi_i)$ can be expressed as:

$$\ln(q_i) = \beta_0 + \sum_{j=1}^{k} \beta_j \ln(z_{ji}) + \nu_i - u_i \quad (5)$$

Since u_i is subtracted from $\ln(q_i)$, restricting $u_i \geq 0$ implies that $0 < \xi_i \leq 1$, as specified above.

Kumbhakar and Lovell (2000) provide a detailed version of the above derivation, and they show that performing an analogous derivation in the dual cost function problem allows us to specify the problem as:

$$\ln(c_i) = \beta_0 + \beta_q \ln(q_i) + \sum_{j=1}^{k} \beta_j \ln(p_{ji}) + \nu_i + u_i \quad (6)$$

where q_i is output, z_{ji} are input quantities, c_i is cost, and the p_{ji} are input prices.

Intuitively, the inefficiency effect is required to lower output or raise expenditure, depending on the specification.

The explicit Cobb-Douglas functional form of the empirical model used for the study of MFIs in this study is specified as follows:

$$lnC_i = \beta_0 + \beta_1 \ln\mathrm{LN} + \beta_2 \ln\mathrm{OS} + \beta_3 \mathrm{CB} + \beta_4 \mathrm{CD} + \beta_5 \mathrm{PL} + \beta_6 \mathrm{FI} + (\nu_i + u_i) \quad (7)$$

The inefficiency model is defined as:

$$U_i = \delta_0 + \delta_1 \mathrm{AGE} + \delta_2 \mathrm{SZ} + \delta_3 \mathrm{ALB} + \delta_4 \mathrm{PKS} \quad (8)$$

6. Empirical Results

The stochastic frontier models for each of the four years were estimated using Stata. The standard errors for the estimated coefficients for the year 2005 were extremely small, resulting in most of the coefficients being statistically significant. As a result, we will leave out 2005 in our analysis of the empirical results.

As expected, higher levels of output results in higher cost, indicated by the statistically significant positive sign of the coefficient of loan. The estimated coefficients for other assets are not significant. Higher cost of borrowing should increase costs, but its estimated coefficient has a negative sign for years 2004 and 2007. While the estimated coefficient is not significant for 2007, the negative sign for 2004 can be explained by even higher lending rates associated with higher cost of borrowing. The statistically significant positive sign in 2006 conforms to our expectation. None of the estimated coefficients for cost of deposits is statistically significant. For the years 2006 and 2007, cost of labour has a statistically significant positive sign, indicating that an increase in cost per employee will raise costs. Finally, fixed input does not have any statistically significant impact on costs.

Table 3

Frontier Cost Function Model for MFIs

Variables	2004	2005	2006	2007
Loan	1.001 (0.000)	0.801 (0.000)	0.912 (0.000)	0.900 (0.000)
Other Assets	-0.098 (0.581)	0.137 (0.000)	-0.007 (0.926)	0.017 (0.816)
Cost of Borrowed Funds	-0.305 (0.000)	-0.033 (0.000)	0.118 (0.000)	-0.050 (0.248)
Cost of Deposits	-0.029 (0.805)	-0.072 (0.000)	-0.066 (0.203)	0.022 (0.708)
Price of Labour	0.024 (0.805)	-0.077 (0.000)	0.365 (0.000)	0.151 (0.020)
Fixed Inputs	0.114 (0.217)	0.040 (0.000)	0.018 (0.692)	0.068 (0.111)
Constant	-2.125 (0.062)	-0.607 (0.000)	-4.674 (0.000)	-3.263 (0.000)
Chi	742	8490	3145	1909
Inefficiency Model				
Age	0.391 (0.733)	0.692 (0.565)	-0.005 (0.996)	-1.330 (0.284)
Total Members	-0.989 (0.141)	-0.507 (0.068)	0.110 (0.575)	0.042 (0.853)
Average Loan Balance	-1.323 (0.207)	0.120 (0.632)	-1.294 (0.014)	-1.307 (0.001)
PKSF Borrowing	-4.014 (0.036)	-2.794 (0.037)	-1.910 (0.095)	-4.718 (0.002)
Constant	18.958 (0.105)	2.820 (0.347)	8.720 (0.091)	13.017 (0.002)

Cost is a function of all input prices; the percentage increase in the total production is based on the interpretation of the coefficient of the Cobb-Douglas function as the elasticity of production. For the year 2006, a one per cent increase in the cost of borrowed funds will increase operating cost by approximately 0.12 per cent, and a one per cent increase in the cost of labour will increase the cost by approximately 0.37 per cent. The scale effect of loan portfolio is positive, but it ranges from 1 to 1.25. Other than the year 2004 where we observe constant returns to scale, the results show increasing returns to scale.

Neither age nor size seems to have any statistically significant effect on the efficiency. The negative coefficient of the average loan balance per borrower implies that larger loans to be more cost efficient, i.e. the decrease in cost efficiency tends to decrease with the average loan size. The negative coefficient of the PKSF borrowing implies that increased borrowing from PKSF seems to reduce cost inefficiency, i.e., increase efficiency. This also evident in Table 4 where the average efficiency level of PKSF partners are consistently lower than their non-partner counterparts.

Table 4

Cost Efficiency – Size and PKSF Partners

Year	Small MFIs	Medium MFIs	Large MFIs	Very Large MFIs	Grameen Bank	PKSF Partners	Non-Partners
2004	2.6089	2.6197	1.4578	1.0599	1.0399	1.661467	3.910097
2005	2.5752	2.2604	2.2287	1.7433	1.0939	14.35152	3.214846
2006	2.0834	1.9986	2.2015	2.9413	1.1394	2.069191	2.206889
2007	2.4080	1.4639	1.711	2.3066	1.0857	1.481994	3.614824

Table 5

Cost Efficiencies of MFIs

Efficiency Level	Frequency	Relative Frequency
1.0 - 1.1	9	10.11
1.1 - 1.2	16	17.98
1.2 -1.3	12	13.48
1.3 - 1.5	11	12.36
1.5 – 1.7	13	14.61
1.7 – 2.0	7	7.87
2.0 - 3.0	10	11.24
3.0 - 21.0	11	12.36

Table 6
Cost Efficiencies of MFIs – by Size

Size of MFI	Efficiency	Number of MFIs
*Big Three	2.0935	3
Large MFIs	1.8990	21
Medium MFIs	2.0135	43
Small MFIs	2.2834	21
*Grameen Bank	1.0655	
*ASA	1.0899	
*BRAC	4.1252	

Table 4 shows that MFIs gradually become more efficient over time for each and every size category and also for PKSF partners and non-partners. A quick glance across the columns reveals that larger MFIs are generally more efficient than smaller MFI, with the very large MFIs being an exception. This is better captured in Table 6 where we report the four-year average inefficiency scores according to the size of MFIs. While two of the very large MFIs are actually the most efficient MFIs, its inefficiency is dragged up by the high inefficiency level of BRAC. Table 5 provides a count of MFIs ranked according to their inefficiency level.

7. Conclusion

The results from our study show that size matters and larger MFIs are more efficient than smaller MFIs. Amongst the big three, Grameen Bank and ASA are very close to the efficient frontier. As smaller MFIs survive and grow they undergo the process of learning efficiency. There is also some evidence of learning by all MFIs over time. Donors and government agencies can formulate policies that foster the growth of small MFIs that are successful and facilitate an even playing field between large and small MFIs. On an average, PKSF partners are more efficient than those who are not PKSF partners. We believe the efficiency of PKSF partners can be attributed to their uniform disclosure and organisational practice. Future research can focus on correlation and interaction between disclosure and organisational structure and efficiency. There is a trade-off between depth of outreach (inverse of average loan balance per borrower) and cost efficiency.

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The Institute of Microfinance (InM) is an independent non-profit organisation established primarily to meet the research and training needs of national as well as of global microcredit programmes. Initiated and promoted by Palli Karma-Sahayak Foundation (PKSF) on 1 November 2006, the Institute is principally funded by UKaid, Department for International Development (DFID) through its Promoting Financial Services for Poverty Reduction (PROSPER) Programme. InM has an excellent team of professionals in research, training and knowledge management. InM draws research scholars from reputed universities here and abroad. The major services that InM provides are research on poverty, microfinance, enterprise development, impact assessment and evaluation of microfinance programmes. Beside research, InM provides microfinance related training, capacity building support and knowledge management services to microfinance institutions and other development organisations.

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