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OBJECTIVES
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ANALYZING PRACTICES OF MANAGING RISK IN MICRO FINANCE INSTITUTIONS USING PRINCIPAL COMPONENT ANALYSIS – A CASE OF TELANGANA STATE

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ABSTRACT

Micro finance in India is again on a path of steady growth and is facing new challenges. The main challenge of microfinance is to create social benefits and promote low income households by providing financial services without any suitable guarantees. It is in this context that the issue of risk management in microfinance institutions becomes highly relevant. CRISIL estimates that around 120 million households in India continue to face financial exclusion translation into a credit demand around Rs. 1.2 billion. Indian micro finance sector was a world leader few years ago. However, the sector faced a severe crisis and witnessed mass default by some borrowers in the year 2010. This study used an exploratory research design with the main objective of identifying factors/ components contributing towards management of risk in MFIs in Telangana state of India. Accordingly, this study conducted a Principal component analysis and identified 6 factors that address risk management. Study was conducted using a pilot tested questionnaire addressed to Managers, risk officers and executives from 6 MFIs in Telangana state.

KEYWORDS

risk management, micro finance, micro credit.

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1. INTRODUCTION

The concept of micro credit was first formalized by Dr. Muhammed Younus in 1976 in Bangladesh. Ever since most developing economies are looking microfinance as a means to alleviate poverty. The main challenge of microfinance is to create social benefits and promote low income households by providing financial services without any suitable guarantees. It is in this context that the issue of risk management in microfinance institutions becomes increasingly relevant.

The microfinance market currently faces a trend towards "commercialization" which is a broad term used to refer to the application of market-based business principles to microfinance. This is usually associated with a MFI's development away from donor or subsidized funding towards commercial borrowing of debt and equity (**Frank, 2008**). MFIs are moving towards commercialization exposing them to various types of risk.

Crisil estimates that around 120 million households in India continue to face financial exclusion translation into a credit demand around Rs. 1.2 billion. Indian micro finance sector was a world leader few years ago. However, the sector faced a severe crisis and witnessed mass default by some borrowers in the year 2010. It is also observed that sector's outreach and loan portfolio had drastically dropped. However, once again there is a steady growth again in this sector. In order to ensure that the current upsurge in the sector does not go 2010-11 way, it is essential to learn from earlier experiences. It is with this observation the researcher focused on risk management practices

2. REVIEW OF LITERATURE

In the study titled" **An Appraisal of Risk Management Practices of Microfinance Institutions in Ghana"** conducted by **Akwasi A. Boateng & Gilbert O. Boateng (2014),** It was discovered that the barriers to microfinance institutions success includes numerous and varied obstacles. Studies conducted confirmed microfinance institutions managements are ignorant pertaining to the risks their organizations face with risk management techniques deployed reactively and ineffectively. By embedding a structured approach to enterprise risk management within MFIs, potential benefits such as reducing the over-management of risks and organizational alignment towards the microfinance institution's mission can be realized. This study used secondary data sources for drawing these conclusions.

Rosman (2009) has proposed a research framework on RMPs and the aspects of risk management processes. This framework observes the relationship between RMPs and the four aspects of risk management process i.e.: (1) Understanding risk and risk management (URM). (2) Risk identification (RI). (3) Risk analysis and assessment (RAA) (4) Risk monitoring (RM). This framework has been extensively used in several studies.

The study titled "Banks risk management: A comparison of UAE national and foreign banks" by, **Hussein A. Hassan Al-Tamimi & Faris Mohammed Al-Mazrooei (2007)** tried to examine the degree to which UAE banks use risk management practices and techniques in dealing with different types of risk. This study has used Cronbach's alpha, descriptive statistics, regression analysis and one-way ANOVA.

A close analysis of literature reveals that there are several studies conducted in banking and other financial areas in risk management practices (Akwasi et.al (2014), **Seyram Pearl et.al, (2014), Hussien & Faris (2007), Hassan (2007),** and very few on risk management in microfinance sector**.** Similarly, there are several studies conducted relating to microfinance institutions, however most of these studies are concentrated around outreach, sustainability and profitability (**Berhanu (2007), Alemayehu (2008) Letenah (2009) Aklilu (2002) Gashaw Tsegaye Ayele (2014) Borchgrevink and et. al (2005)).** These studies examined performance of MFIs with little or no indication of risk involved and strategies adopted, there are several other studies such as **Yonas (2012), Sima (2013), Melkamu (2012)** all examining outreach and financial performance but none about risk management practices of microfinance institutions. Moreover, most of these studies are master's thesis with limited scope.

Thus, to surmise there are several studies focused on the risk management practices of commercial banks and other financial institutions Similarly a number of studies have been conducted on outreach, sustainability and financial performance of microfinance institutions.

3. METHODOLOGY FOLLOWED IN THIS STUDY

This study used an exploratory research design as it attempts to investigate the practices of risk management adopted by micro finance institution in India, especially those headquartered in Telangana state

The main objective of this study is to investigate the risk management practices of microfinance institutions in India, especially of those that are headquartered in Telangana state.

The study has the following specific research objectives

3.1 RESEARCH OBJECTIVES & HYPOTHESIS

1. To examine the practices of risk management adopted by micro finance institutions.
2. To identify the best practices used in managing risk
3. To classify practices of risk management in Telangana state

3.2 POPULATION OF THE STUDY AND SAMPLE FOR THE STUDY

The population of the study includes all microfinance institutions existing in India and there are 268 MFI as per the **directory of microfinance institutions (2014)** This study intended to use all the microfinance institutions that are located in the state of Telangana. Accordingly, there were 11 microfinance institutions head-quartered in the state of Telangana.

The respondents of the study were expected to be drawn from

1. Asmitha Microfin Ltd.(NBFC)
2. Aware Macs Ltd.(Cooperative)
3. Bhartiya Samruddhi Finance Ltd(Basix) (NBFC)
4. Development Organization for Village Environment (DOVE)(Society)
5. Indur Intideepam Macs Federation Ltd.(Cooperative)
6. Pragathi Seva Samithi Macs Federation(Cooperative)
7. Share Microfin Ltd.(NBFC)
8. SKS Microfinance Ltd.(NBFC)
9. Spandana Sphoorty Financial Ltd.(NBFC)
10. Swaws Credit Corporation India Pvt. Ltd.(NBFC)
11. Trident Microfin Pvt. Ltd.(NBFC)

An initial study of the microfinance sector in Telangana has revealed that post 'Andhra Pradesh microfinance crisis of 2011' most MFIs have either reduced their microfinance business or else have completely moved to other lines of finance. Only Asmitha Microfin Ltd. (NBFC) Bhartiya Samruddhi Finance Ltd (Basix) (NBFC), Pragathi Seva Samithi Macs Federation(Cooperative), Share Microfin Ltd. (NBFC), SKS Microfinance Ltd. (NBFC), Spandana Sphoorty Financial Ltd.(NBFC) are currently into microfinance business.

Further the researcher included 10 managers, 20 credit/loan manager/officers and 10 executives from all the sample MFIs. The manager, credit officer and executives were randomly selected to become a part of the study. This study used purposive random sampling

3.3 DATE SOURCES AND ANALYSIS

The study used both primary and secondary data sources. Primary data was collected from managers, risk management officers and some selected senior officers of the designated microfinance institutions. For the purpose of collecting primary data a comprehensive questionnaire consisting of 20 questions, using a likert like scale (ranging from 1 upto 5 for strongly disagree to strongly agree) was used. In order to support finding of the primary data secondary data sources such Directory of Microfinance institutions (MFIs) in India**,** Reserve bank of India reports, Crisil agency reports and other documents were also used as needed. This study conducted a principal component analysis to identify factors/ components that contribute in identifying practices of risk management in Telangana state. SPSS IBM 23 version was used to conduct factor analysis and the results of factor analysis are presented in the following sections.

4. ANALYSIS AND RESULTS

In this study data relating to 20 specific questions was collected regarding the various problems that are encountered by export oriented garment factories. Data was collected on a Likert like scale of 1 to 5(1 = strongly disagree; 2 = disagree; 3 – neither agree nor disagree; 4 = agree and 5 = strongly agree). In order to facilitate essay descriptive analysis each question is coded as Q1, Q2 and so on. In addition to this a description of each question is also provided.

4.1 DESCRIPTIVE STATISTICS

In the following section a brief summary of descriptive statistics is provided. Mean, and standard deviation of each question is calculated. This gives an initial understanding regarding 20 questions poised to the respondents Showing descriptive statistics of practices risk management of MFIs.

TABLE 1 (N =240)

	Variable	Mean	Std. Dev
Q1	Common understanding of risk management	3.63	.964
Q2	All employees are aware of importance of managing risk	3.26	1.211
Q3	All employees are aware of the various categories of risk facing the MFI	2.75	.971
Q4	Management of risk has to be treated as a separate function with an independent risk manager.	4.21	.829
Q5	Responsibility for risk management is clearly set out and understood throughout the MFI	3.31	1.167
Q6	Accountability for risk management is clearly set out and understood throughout the MFI	3.58	.952
Q7	Risk manager is identified and he is fully aware of his responsibilities	3.97	.944
Q8	Managing risk is important to the performance and success of the MFI	4.76	.507
Q9	It is crucial to apply the most sophisticated techniques in risk management	3.48	1.135
Q10	MFI has the objective to use advanced risk management techniques	3.92	.755
Q11	It is important for MFI to emphasize on the continuous review and evaluation of the techniques used in risk management	4.53	.720
Q12	Applications of risk management techniques reduce costs or expected losses	4.61	.596
Q13	The MFI carries out a comprehensive and systematic identification of its risks relating to each of its declared aims and objectives	3.61	.856
Q14	The MFI is able to identify the risks it faces finds it easy to prioritize its main risks	3.86	.580
Q15	Changes in risk are recognized and identified with the MFI's roles and responsibilities	3.55	.775
Q16	The MFI is aware of the strengths and weaknesses of the risk management systems of other MFIs	3.43	.921
Q17	The MFI is aware of the risks that other MFIs are dealing with	3.33	.820
Q18	Concentration of MFI's funds in one specific sector of the economy is risky	4.35	.608
Q19	MFI has sufficient capital to deal with risk	2.85	1.328
Q20	level of risk management practices of this MFI are excellent	3.04	1.292

4.2 ASSESSMENT OF THE SUITABILITY OF THE DATA FOR FACTOR ANALYSIS

There are two main issues to consider in determining whether a particular data set is suitable for factor analysis: sample size, and the strength of the relationship among the variables (or items).

4.2.1 Justification of sample size - While conducting factor analysis where there are no hypotheses testing, sample size is still an important issue for evaluation. Nunnally (1978) recommended that at least 10 subjects per variable are necessary to reduce sampling errors. Comrey and Lee (1992) offered the following guidelines for adequate sample sizes: 100 = poor, 200 = fair, 300 = good, 500 = very good, 1000 or more = excellent. Gorsuch (1983) recommended that N should be at least 100. A number of researchers have concluded that an adequate sample size is dependent on other aspects related to the nature of the data and the factor loadings.

4.2.2 Correlation Matrix and KMO (Kaiser–Meyer–Olkin) and Bartlett's test - The second issue to be addressed concerns the strength of the inter-correlations among the items. Tabachnick and Fidell recommend an inspection of the correlation matrix for evidence of coefficients greater than.3. If few correlations above this level are found, then factor analysis may not be appropriate. Two statistical measures are also generated by SPSS to help assess the factorability of the data: Bartlett's test of sphericity (Bartlett, 1954), and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1970, 1974). The Bartlett's test of sphericity should be significant ($p<.05$) for the factor analysis to be considered appropriate. The KMO index ranges from 0 to 1, with.6 suggested as the minimum value for a good factor analysis (Tabachnick & Fidell, 2001).

TABLE 2: CORRELATION MATRIX

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Q1	1.000																			
Q2	.700	1.000																		
Q3	.793	.733	1.000																	
Q4	.413	.307	.296	1.000																
Q5	.647	.543	.506	.385	1.000															
Q6	.600	.445	.422	.400	.902	1.000														
Q7	.223	.490	.170	.393	.601	.513	1.000													
Q8	.358	.279	.208	.658	.013	.078	.222	1.000												
Q9	.552	.566	.603	.195	.630	.569	.240	-.116	1.000											
Q10	.365	.225	.273	.122	.481	.667	-.050	-.150	.369	1.000										
Q11	-.009	-.075	.147	-.121	.055	.115	-.039	-.053	.042	.144	1.000									
Q12	-.171	-.177	-.236	-.129	-.276	-.244	-.139	.220	-.246	.002	.064	1.000								
Q13	.756	.657	.514	.424	.726	.762	.338	.267	.614	.519	-.121	-.118	1.000							
Q14	.485	.653	.502	.522	.601	.486	.711	.145	.525	.050	-.315	-.155	.531	1.000						
Q15	.558	.404	.446	.451	.782	.750	.377	.172	.603	.257	.039	-.401	.639	.419	1.000					
Q16	.150	-.048	-.108	-.086	.082	.238	-.005	.190	-.250	.298	-.116	.339	.191	-.078	.049	1.000				
Q17	.201	.150	-.022	.317	.379	.385	.358	.337	.112	.078	-.338	.156	.349	.332	.378	.620	1.000			
Q18	.091	.376	.121	.302	.201	.130	.696	.281	-.009	-.411	-.012	-.137	.117	.551	.255	.103	.344	1.000		
Q19	.040	.228	.086	-.122	.463	.250	.527	-.459	.335	-.017	.051	-.319	.042	.467	.192	-.179	-.031	.248	1.000	
Q20	.495	.668	.505	.313	.778	.653	.725	-.089	.750	.192	-.049	-.334	.619	.805	.619	-.196	.214	.463	.616	1.000

Source: Researcher's own computation from primary data sources

Table 2 shows the correlation matrix of 20 items used in this study. It is observed that 17 out of 20 items correlated with at least one other item with a correlation of more than 0.3 suggesting reasonable factorability.

4.3 KMO (Kaiser-Meyer-Olkin) AND Bartlett's TEST RESULTS

TABLE 4: KMO AND Bartlett's TEST RESULTS

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.594
Bartlett's Test of Sphericity	Approx. Chi-Square	6203.819
	df	190
	Sig.	.000

Source: Researcher's own computation from primary data sources

Table 4 shows the KMO (Kaiser-Meyer-Olkin) and Bartlett test results. The Bartlett's test of sphericity is significant in this case with p = 0.000 ($p<0.05$) and factor analysis is considered appropriate. Further KMO index is at.594, though not 0.6, it is approaching 0.6 (at 0.594) therefore minimum value for good factor analysis is achieved. As the data of this study passes both KMO and Barlett tests, Factor analysis can be proceeded with.

4.4 DETERMINING THE METHOD OF FACTOR ANALYSIS

The two basic approaches are principal components analysis and common factor analysis. In principal components analysis, the total variance in the data is considered. Principal components analysis is recommended when the primary concern is to determine the minimum number of factors that will account for maximum variance in the data for use in subsequent multivariate analysis. The factors are called principal components. [Malhotra & Birks (2007)]. Therefore, in this study Principal Component method of factor analysis is used.

4.5 RESULTS OF PRINCIPAL COMPONENT ANALYSIS

The results of principal component matrix are explained in terms of communalities, total variance explained and Rotated component matrix.

4.5.1 Communalities - Communality is the amount of variance a variable share with all the other variables being considered. This is also the proportion of variance explained by then common factors. [Naresh and Birks (2007)]. As per table 5 showing communalities, it can be seen that initial values are 1.00 with all extraction values exceeding 0.3 confirming that each item shared some common variance with other items.

TABLE 5: SHOWING COMMUNALITIES

Item no.	Item Description	Initial	Extraction
Q1	Common understanding of risk management	1.000	.832
Q2	All employees are aware of importance of managing risk	1.000	.848
Q3	All employees are aware of the various categories of risk facing the MFI	1.000	.831
Q4	Management of risk has to be treated as a separate function with an independent risk manager.	1.000	.786
Q5	Responsibility for risk management is clearly set out and understood throughout the MFI	1.000	.920
Q6	Accountability for risk management is clearly set out and understood throughout the MFI	1.000	.947
Q7	Risk manager is identified and he is fully aware of his responsibilities	1.000	.873
Q8	Managing risk is important to the performance and success of the MFI	1.000	.911
Q9	It is crucial to apply the most sophisticated techniques in risk management	1.000	.752
Q10	Your MFI has the objective to use advanced risk management techniques	1.000	.787
Q11	It is important for your MFI to emphasize on the continuous review and evaluation of the techniques used in risk management	1.000	.962
Q12	Applications of risk management techniques reduce costs or expected losses	1.000	.690
Q13	The MFI carries out a comprehensive and systematic identification of its risks relating to each of its declared aims and objectives	1.000	.827
Q14	The MFI is able to identify the risks it faces finds it easy to prioritize its main risks	1.000	.876
Q15	Changes in risk are recognized and identified with the MFI's roles and responsibilities	1.000	.801
Q16	The MFI is aware of the strengths and weaknesses of the risk management systems of other MFIs	1.000	.832
Q17	The MFI is aware of the risks that other MFIs are dealing with	1.000	.817
Q18	It is too dangerous to concentrate MFI's funds in one specific sector of the economy	1.000	.834
Q19	MFI has sufficient capital to deal with risk	1.000	.823
Q20	Overall, I consider the level of risk management practices of this MFI to be excellent	1.000	.940

Source: Extraction Method: Principal Component Analysis. (Researchers Computation)

4.5.2 Total variance explained - The total variance explained matrix is provided under table 6. The number of factors to be considered is based on Eigen values. Eigen values greater than 1.0 are retained; the other factors are not included in the model. An eigen value represents the amount of variance associated with the factor. Hence, only factors with a variance greater than 1.0 are included. Determination of factors may also be based on percentage of variance. In this approach, the number of factors extracted is determined so that the cumulative percentage of variance extracted by the factors reaches a satisfactory level. It is recommended that the factors extracted should account for at least 80% of the variance. Considering both the approaches it is found that 6 components can be extracted where the Eigen values are exceeding 1 and at the same time 84.43% of variance explained.

TABLE 6: TOTAL VARIANCE EXPLAINED

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var	Cum %	Total	% of Var	Cum %	Total	% of Var	Cum %
1	7.796	38.982	38.982	7.796	38.982	38.982	4.141	20.703	20.703
2	2.613	13.065	52.047	2.613	13.065	52.047	3.914	19.571	40.274
3	2.457	12.283	64.330	2.457	12.283	64.330	3.356	16.780	57.054
4	1.764	8.818	73.147	1.764	8.818	73.147	2.172	10.860	67.914
5	1.161	5.804	78.952	1.161	5.804	78.952	1.946	9.730	77.645
6	1.097	5.483	84.435	1.097	5.483	84.435	1.358	6.790	84.435
7	.800	3.999	88.433						
8	.602	3.009	91.442						
9	.403	2.017	93.460						
10	.346	1.731	95.190						
11	.261	1.303	96.494						
12	.205	1.024	97.518						
13	.154	.770	98.288						
14	.131	.653	98.941						
15	.083	.415	99.356						
16	.054	.268	99.624						
17	.030	.149	99.774						
18	.024	.121	99.895						
19	.015	.077	99.971						
20	.006	.029	100.000						

Extraction Method: Principal Component Analysis.

Further identified component 1 explains 38.98% of variance, Component 2 explains 13.06% of variance, component 3 explains 12.28% of variance, Component 4 explains 8.81% of variance, Component 5 explains 5.8 %, Component 6 explains 5.48. Thus a total cumulative 84.43 % of the variance is explained by these 6 components or factors.

4.5.3 Rotated component matrix - Although the initial or unrotated factor matrix indicates the relationship between the factors and individual variables, it seldom results in factors that can be interpreted, because the factors are correlated with many variables. Through rotation, the factor matrix is transformed into a simpler one that is easier to interpret. Table 7 shows the Rotated component matrix using Varimax rotation matrix.

TABLE 7: ROTATED COMPONENT MATRIX

	Component					
	1	2	3	4	5	6
Q1	**.893**	.310				
Q2	**.796**	.400	.348			
Q3	**.773**					
Q4	**.664**		-.391			
Q5	.618	**.606**				
Q6		**.857**				
Q7		**.839**	.337			
Q8	.407	**.770**				
Q9	.466	**.650**				
Q10			**.879**			
Q11			**.874**			
Q12		.544	**.648**			.327
Q13	.453	.525	**.603**			
Q14				**.902**		
Q15.	.332			**.730**		
Q16			.583	**.620**		
Q17					**.849**	
Q18	-.349				**.735**	
Q19	.415		.338		**.532**	.415
Q20						**.975**

Extraction Method: Principal Component Analysis;
Rotation Method: Varimax with Kaiser Normalization.
Component 1 up to 6 are identified from table 8, A closer look at table 8 reveals the following factors.

TABLE 8: SHOWING FACTORS IDENTIFIED WITH CORRESPONDING QUESTIONS

Factors/ Component	Questions included in Factors/ Components
1	Q1,Q2,Q3,Q4
2	Q5,Q6,Q7, Q8, Q9
3	Q10, Q11,. Q12, Q13
4	Q14, Q15, Q16
5	Q17, Q18, Q19
6	Q20

Source: Researcher's own computation from SPSS output

Therefore, Factor 1 has high coefficients for Q1, Q2, Q3, Q4, Factor 2 has high coefficients for Q5, Q6, Q7, Q9, while Factor 3 has for Q10, Q11, Q12, Q13, Factor 4 for Q14, Q15, Q16, Factor 5 for Q17, Q18, Q19, and Factor 6 for Q20

5. CONCLUSION

A closer observation reveals that Factor 1 up to Factor 5 explain about 80% of the total variance and therefore, Factor 6 may be ignored at this point as only one item is included in this factor.

TABLE 9: LATENT FACTOR DESCRIPTION

Factor	Questions Grouped
Factor 1	Common understanding of risk management (Q1) All employees are aware of importance of managing risk (Q2) All employees are aware of the various categories of risk facing the MFI (Q3) Management of risk has to be treated as a separate function with an independent risk manager. (Q4)
Factor 2	Responsibility for risk management is clearly set out and understood throughout the MFI(Q5) Accountability for risk management is clearly set out and understood throughout the MFI(Q6) Risk manager is identified and he is fully aware of his responsibilities(Q7) Managing risk is important to the performance and success of the MFI(Q8) It is crucial to apply the most sophisticated techniques in risk management(Q9)
Factor 3	MFI has the objective to use advanced risk management techniques(Q10) It is important for MFI to emphasize on the continuous review and evaluation of the techniques used in risk management(Q11) Applications of risk management techniques reduce costs or expected losses(Q12) The MFI carries out a comprehensive and systematic identification of its risks relating to each of its declared aims and objectives(Q13)
Factor 4	The MFI is able to identify the risks it faces finds it easy to prioritize its main risks (Q14) Changes in risk are recognized and identified with the MFI's roles and responsibilities(Q15) The MFI is aware of the strengths and weaknesses of the risk management systems of other MFIs(Q16)
Factor 5	The MFI is aware of the risks that other MFIs are dealing with(Q17) Concentration of MFI's funds in one specific sector of the economy is risky(Q18) MFI has sufficient capital to deal with risk(Q19)
Factor 6	level of risk management practices of this MFI are excellent(Q20)

Source: Researcher's own computation from SPSS output

Thus this study establishes that practices of risk management can be divided into 6 factors, or in other words six components/ factors are identified in this study. Further research is possible to establish a relationship between these components in addressing risk management in general

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