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E-Readiness assessment of microfinance institutions in Kenya

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Abstract
The financial industry has in recent years embraced the use of information and communication technologies (ICTs) such as e-banking for transactions, m-banking for payment channels development and e-business for logistics. Digital financial service delivery channels and methodologies face a number of challenges mainly the e-readiness assessment of Microfinance institutions. This paper presents the results of a study on the level of e-Readiness in Microfinance Institutions in Kenya and an Integrated Framework for Assessing (IFA) the e-Readiness levels of Microfinance Institutions. We deployed the proposed framework on selected microfinance institutions in Kenya to evaluate its performance and the case study shows our method can achieve a satisfactory results.

Keywords: Microfinance Institutions, e-Readiness, e-Readiness assessment frameworks, financial services, Kenya.

1. Introduction

Microfinance institutions (MFIs) in Kenya provide a variety of financial services and products that includes deposit mobilization, lending, money transfer and micro-insurance using innovative delivery channels and methodologies to the economically active poor, low-income households and micro and small scale enterprises in both rural and urban areas. According to the Central Bank, Bank Supervision Annual report (2013), only 22% of Kenyans have access to formal financial services through commercial banks. An additional 9% are served by Savings and Credit Co-operative societies (SACCOs) and Microfinance Institutions, while 35% of Kenyans depend primarily on informal financial service providers such as Table banking, Rotating and Accumulating Savings and Credit Associations (ROSCAs) (Central Bank of Kenya, 2013). The demand for a wide variety of accessible and affordable financial services and products by clients is high, which calls for innovative delivery channels and methodologies. In order for financial service providers to respond, they need to continue to leverage on ICT and ICT enabled services. This has seen a rapid increase in the role and use of ICT in the financial sector. New information technologies and emerging business forces have triggered a new wave of financial innovation-electronic banking (e-banking). Several studies indicate that online bankers are the most profitable and wealthiest segment to banks. On this basis, no bank today can underestimate the power of the online channel (Haghighi et al., 2010). A study on barriers of e-banking infrastructure lists them into four categories namely: professional and technical barriers, legal and social barriers, strategic barriers, and financial and economic barriers (Sarokolaei et al., 2012).

The infusion of ICT in microfinance industry is not uniform across the various players and may reward those who have the ability to adopt and use ICT with increased benefits and advantages like better customer services, improved corporate image, efficiency and timely delivery of services. Various studies indicate that Microfinance Institutions have different levels of ICT adoption and usage from Brazil to India, and the world over (Maugis et al., 2004; Beig et al., 2007).

Most of the existing e-readiness frameworks are E-economy readiness tools that focus on a nation's readiness and E-society readiness tools that measure the ability of the overall society. There are few frameworks for industry level and sector level (Aminali, 2007). Additionally E-readiness assessment in developing world have been studied in recent years by many researchers but few specifically address issues of MFIs in developing countries at industry and country level (Akhavan et al., 2012), and in Kenya such studies are lacking. Microfinance Institutions face challenges of e-readiness assessment which affects MFIs development of ICT strategy and monitoring progress of ICT strategy implementation.

The main objective of this study was to develop a framework for assessing the E-readiness levels of Microfinance institutions. The proposed framework is validated with the analysis of data collected from Microfinance institutions and their clients in Kenya.

To achieve this objective, a number of e-readiness assessment approaches were reviewed with a view of identifying categories and indicators for use in the study. It results to a proposed e-readiness assessment framework for Microfinance institutions dubbed IFA. The proposed framework is validated with the analysis of

data collected from Microfinance institutions and their clients in Kenya. We sent out 30 questionnaires to the Microfinance institutions. Out of the total questionnaires, 28 valid responses were received from the Microfinance institutions, and this was considered sufficient for analysis. The information and data collected was analyzed using SPSS and Excel to describe and explore the factors determining e-readiness in MFIs. The detailed staging frameworks described in section 3 guided the analysis of data. Data from the database was first exported into the SPSS tool that was used to analyze the data. The results of analysis and staging are contained in section 4. The results are presented in tables and radar diagrams as shown in section 4.

The rest of this paper is organized as follows; Section 2 presents related works. Section 3 presents research methodology, Section 4 presents the experimental/case study results and finally Section 5 presents the conclusion.

2. Related Work

There exist multiple organizational, macro environmental and banking industry specific reasons for adoption of e-readiness in financial institutions in Kenya. Those factors that can move/inhibit e-banking services development have non uniform contribution to overall e-readiness of MFIs; simply their importance to E-readiness is not the same. Some of them require more attention from banks and policy makers at the initial level of adoption of ICT whereas others need more emphasize at later stages.

2.1 The concept of E-readiness

There is no standard definition for e-readiness mainly because it is a relatively new concept. E-readiness has been defined as the degree in which a country, business enterprises, or community is prepared and qualified to participate in the networked world in their degree of relative knowledge and preparedness in most of the important areas for the adoption and use of ICTs and ICT applications (Centre for International Development, 2001). We formally define e-readiness in relation to the MFIs as capability to adopt, use and benefit from ICT in the provision of financial services to their clients.

2.2 E-Readiness Frameworks and Tools

In the following sub-section, we review the related work in the literature, which describe various e-readiness frameworks and tools that exist.

2.2.1 The CID E-Readiness Tool

The Centre for International Development (CID) at Harvard University developed this guide titled, “readiness for the Networked World”. The CID tool is an example of an e-society tool that measures the ability of the overall society to benefit from ICT (Centre for International Development, 2001; Bridges.org 2001; Peters, 2001). The tool monitors five categories organized into nineteen indicators to determine the network readiness Index of a community. It is gauged by assessing a community’s relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICTs.

The five categories and nineteen indicators are as follows: Network Access This measures readiness of ICT infrastructure in terms of bandwidth, availability, reliability cost and quality, services and equipments, pricing, etc. The six indicators are information infrastructure, internet availability, network speed and quality, hardware and software, and services and support; Networked Economy This group measures the use of ICT by businesses and the government in commerce and/or delivery of services. The four indicators include ICT employment opportunities, business-to-customer (B2C) e-commerce, business-to business (B2B) e-commerce and e-government; Networked Learning, This group aims to measure the level of access to ICT by educational institutions, the ICT related programs and utilization of ICT in teaching and learning. The three indicators are schools access to ICTs, enhancing education with ICT and developing the ICT workforce; Networked Society This group measures the degree to which people and organizations are using ICT. The four indicators include people and organization online, locally relevant content, ICT in everyday life, and ICT in the workplace; Network Policy This group is used to assess the ICT policy strategy and/or legislation and the success or failure of the policy or regulatory environment. Two Indicators are telecommunications regulations and ICT trade policy.

The CID tool provides a grid with descriptions of the four stages of advancements in each of 19 indicators, which are placed into five categories. Communities estimate their current stage of development in each indicator. No prescription is given on how that estimate should be made. Also CID rates the stage a community is in for each of the 19 indicators and descriptions are given of what's required to be in a particular stage (Aminali, 2007). Communities may have difficulty placing themselves in a specific stage within a particular or some set of categories, as certain indicators within a stage may not be consistently linked.

2.2.2 CSPP's E-Readiness Guide for Living in the Network World

The Computer System Policy Project (CSPP) developed in 1998 was designed to help individuals and communities determine how prepared they are to participate in the network world (Bridges.org, 2001; Peters, 2001). The network measures the prevalence and integration of ICT in homes, schools, businesses, health care facilities and government offices with additional focus on competition among access providers speed of access and government policy. Measurement is divided into five dimensions namely: Network Infrastructure, Network Places, Network Applications and Services, Network Economy, and Network World Enablers. The assessment produces a rating that indicates the country or community's stage the country or community is at for each of the five categories. Furthermore, 'an overall score' for the country or community can be estimated by simply assigning weights and averaging the scores across the criteria. This guide is a starting point but does not specifically address issues in MFIs in Kenya context.

2.2.3 APEC's E-Commerce Readiness Assessment tool

The Asian Pacific Economic Co-operation (APEC) Electronic Commerce Steering Group developed this tool/guide in 2000, to help governments develop their own focused policies, adapted to their specific environment for the healthy development of e-commerce (Bridges.org 2001; Peters, 2001; Ruikar, 2004; Vaezi and Bimar, 2009). The tool asks participants 100 multiple-choice questions grouped into six categories namely Basic infrastructure and technology, Access to network services, Use of the internet, Promotion and facilitation of industry led standards, Skills and human resources, Positioning for the digital economy and the responses indicate progressive levels of e-Readiness for a country or community. However, there is no overall scoring used. The product of assessment is based on the answers to the questions and countries are supposed to work on areas with less than optimal answers to reduce or eliminate impediments to the deployment of e-commerce, e-government and e-society.

2.2.3 McConnell International

McConnell International proposed an assessment tool in collaboration with the World Information Technology and Services Alliance (WITSA). This tool measures five key areas namely; Connectivity, Government Policies, Information Security, Human Capacity, and E-Business Climate (Maugis and Choucri 2004; McConnell International 2001). For each country and category, the tool performs a dynamic evaluation of the relevance and accuracy of available quantitative data with an understanding of myriad cultural, institutional and historical factors. These ratings and their narratives can be used as a starting point for further planning and analysis. Countries are rated in the five categories listed above on a scale of one to three (Blue, Amber and Red) and extensive analysis and recommendations are given. However it focuses on country level, different from our focus on industry segment. The track record of studies addressing e-Readiness matters is as impressive as it is wanting.

2.2.4 E-Banking Framework.

In this paper, e-Readiness is defined as a function of the ability to pursue value creation opportunities. It emphasizes the fact that in e-banking as it is likely that some e-Readiness factors are more informative than others, thus useful to know what factors are critical, for which profiles, why and how. The Domains of e-Readiness include the following Access domain with indicators Infrastructure and Services, Capacity domain; identified indicators are Social factors, Economic factors and Policy factors and lastly Opportunities domain indicators are Opportunity penetration, Specific applications, e-banking, B2B and B2C, and Payment systems (Maugis and Choucri 2004). The framework main focus is e-readiness at industry level, a contrary to our context where sector level is the problem.

2.2.5 Verdict

The VERDICT (Verify End User e-Readiness) tool was developed to measure e-Readiness of specific industry sectors to adopt internet technologies (Ruikar 2004; Aminali, 2007). It measures the readiness level of

organization to adapt and use e-commerce. The framework has four main categories: People, Process, Technology, and Management.

All four categories are considered important for an organization to be e-ready. VERDICT has a set of questions for each of these categories. In each question a statement is given. The statements and respondents choose only one choice among six possible answer ones for each statement due to their agreement or disagreement with the statement. VERDICT relies on the judgment of the respondents as to whether or not they agree with the statements in the context of their organization, department or work group. The responses from these questionnaires are converted in scores under the broad categories of the areas considered.

The scores are averaged and depending on the average score, the respondents are presented with traffic light indicators, namely Red, Amber and Green to visually indicate their e-readiness in each Category as shown in Table 1. Red is an average score greater than or equal to zero and less than 2.5. Red indicates that several aspects within a category need urgent attention to achieve e-readiness. On the other hand, Amber is an average score greater than or equal to 2.5 and less than 3.5. Amber indicates that several aspects within a category need attention to achieve e-readiness. While, Green is an average score greater than or equal to 3.5 and less than or equal to 5. Green indicates that the end-user organization has adequate capability and maturity in these aspects and therefore e-ready (in those respects). The VERDICT was used in staging in a different industry and different categories. In this paper we adapt VERDICT tool for staging.

Table 1: Guideline of Verdict's boundaries

Range	Traffic light
$3.5 \leq X \leq 5$	Green
$2.5 \leq X < 3.5$	Amber
$0 \leq X < 2.5$	Red

2.2.6 Summary of Categories and Indicators in existing Frameworks

We present a summary of the various tools and frameworks reviewed from previous studies in table 2. These studies are impressive because they reflect the views and interests (as well as the methods and approaches) of consulting firms, academic researchers, and government organizations, national as well as international. However, they are limited in that it is difficult to extract a coherent view of the realities at hand, or the methods upon which they are developed. As such, they provide little guidance for business and government, perhaps even obscuring the realities as well as the opportunities (Haghighi, et al., 2010)

Table 2: Summary of existing Frameworks and Tools

Category	Indicators	Framework/Tool
Network Access	Infrastructure	CSPP; CID; APEC; NRI; McConnel international tool; VERDICT
	Access to Services	CSPP; CID;
	ICT employment opportunities	CID; APEC; Mc Connel international tool
Networked economy	Payments	E-Banking Framework
	E-banking	E-Banking Framework
	Institutional ICT policy and strategy	McConnell international tool, APEC; CID tool;
Network Policy	ICT Human Capacity	VERDICT & E-commerce; McConnell international tool, APEC; CID tool
	ICT financing	McConnell international tool
	Clients and Microfinance Institutions online	CID tool
Networked society	ICT in every day life	CID
	ICT in Microfinance Institutions (workplace)	CID

It is expected that some e-Readiness categories and indicators are more informative than others. It would be useful to know what indicators are critical, for which categories why and how.

3. Research Methodologies

The proposed framework was derived from an e-readiness assessment framework (Centre for International Development, 2001; Maugis and Choucri, 2004; Vaezi and Bimar, 2009). We used these e-Readiness frameworks to form the basis of identifying the categories and indicators for the e-Readiness assessment of the microfinance institutions as shown in Table 2. To make it applicable for this study, there was need to modify it. There is no one correct method to use the Guide; each community should determine how the guide best addressees its own needs. Depending on the resources and goals of the community, the assessment process and results will vary in detail, depth and scope (Centre for International Development, 2001)

The original CID tool specified 19 indicators. However, some of the indicators are not relevant for microfinance institutions in the Kenyan context. The indicators of enhancing education with ICT and schools access to information and communication technologies are not relevant to the MFIs. Apart from eliminating some of the 19 indicators, we introduced three new indicators (e-banking, payments, ICT financing) and renamed two indicators detailed in section 4.4. The MFIs is a sector in the banking industry, hence the two indicators in CID tool weren't applicable, and from the MFIs perspective policy strategy is mainly concerned with ICT environment.

We applied a sampling formula in Kothari (2008), to determine the proportion, ρ, in the target population of MFIs. The 30 Association of Microfinance Institution member Microfinance institutions at December 2013 had 1.44 million clients (Central Bank of Kenya, 2013). The results give the minimum desired sample of 25 MFIs out of the entire population of 30. However, the study uses the sample of the entire population of 30 for better representation.

3.1 Data Collection and Analysis

Data was collected from both primary and secondary data sources. Primary data was collected through questionnaires and secondary data was gathered from written reports, articles and especially from official and related websites of Microfinance Institutions. This complementary information was intended for describing the industry and also for getting the best result in measuring the e-readiness level within MFIs industry. Piloting of the questionnaire was done on three selected MFIs. To ensure the validity of the questionnaire, we targeted the Chief Executives, ICT and General Managers of MFIs as respondents because they are the ones who possess the most accurate and complete information with regard to the research problem and the MFIs business operations, business environment and ICT applications.

Reliability of the questionnaire was tested using the Cronbach's alpha coefficient (α). A value (α) should be greater than 0.5 ($\alpha > 0.5$). The result obtained an excellent measure for alpha (α) in all sets of the questions with an alpha of 0.93 ($\alpha = 0.93$) for the entire questionnaire instruments (Cronbach, 1951).

4 Results and Discussion

In this section, we present the results of our study. We employed statistical methods factor analysis and regression analysis to determine the categories and indicators of our proposed framework. We used the proposed framework to measure e-readiness of selected MFIs in Kenya.

4.1 Correlation Matrix for e-readiness Categories

Correlation indicates the strength and direction of a linear relationship between two or more random variables. Correlation coefficients range from -1.0 to +1.0. The sign of the coefficient represents the direction of the relationship. The closer the coefficient is closer to 1.0, whether it is negative or positive, the stronger the relationship. In general, correlations of 0.1 to 0.3 are considered small, 0.3 to 0.7 are considered significant while those above 0.7 are considered large (McDonald, 2008).

The results in Table 3 indicate that the categories have a correlation of above 0.3, which is the lower bound value for a significant relationship. Finally the relationship among categories were clarified and reflected in network diagram shown in Figure 1**.** They are achieved from correlation matrix in table 3.

Table 3: Correlation Matrix of the Categories

	Networked Society	**Network access**	**Networked Economy**	**Networked Policy**
Networked Society	1.0000			
Network access	0.6055	1.0000		
Networked Economy	0.3726	0.8656	1.0000	
Networked Policy	0.6385	0.9190	0.8267	1.0000

The coefficients in table 3 confirms that the four categories of proposed e-readiness framework IFA have significant relationship hence they affect each other in determining the overall e-readiness of an organization. The results represented in figure 1 indicate different categories have varying importance in contributing to e-

readiness hence more attention and priority in the preparations of e-readiness of an organization. For instance the relation between the e-readiness of network access and network policy is above 0.9 meaning the e-readiness of each is related to the other hence need to be e-ready on both to achieve high level of organization e-readiness.

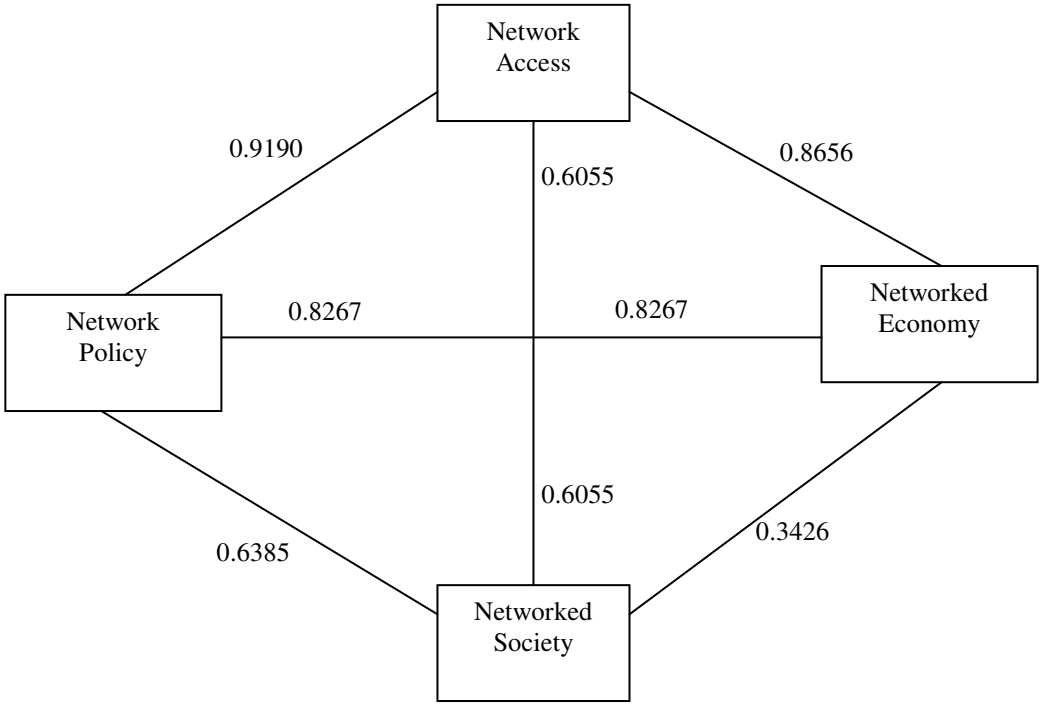

Figure 1: Network diagram of relationship among categories of IFA

4.2 Factorial Validity

Factor analysis assumes that the underlying Categories can be used to explain complex phenomena (Lawrence, 2006). In this study it's used to get sets of indicators (preferably uncorrelated) from Categories in our proposed e-Readiness framework. The process of factor analysis is as follows:

i. The first step in factor analysis is to produce a correlation matrix for all variables. Variables that do not appear to be related to other variables can be identified from this matrix.

ii. The number of factors necessary to represent the data and the method for calculating them must then be determined. Principal component analysis (PCA) is the most widely used method of extracting factors. In PCA, linear combinations of variables are formed. The first principal component is that which accounts for the largest amount of variance in the sample, the second principal component is that which accounts for the next largest amount of variance and is uncorrelated with the first and so on. In order to ascertain how well the model (the factor structure) fits the data, coefficients called 'factor loadings' that relate variables to identified factors, is calculated.

iii. Factor models are then often 'rotated' to ensure that each factor has non-zero loadings for only some of the variables. Rotation makes the factor matrix more interpretable.

iv. Following rotation, scores for each factor can be computed for each case in a sample. These scores are often used in further data analysis.

The study tested the validity of our data to factor analysis using the Kaiser-Meyer-Olkin method (KMO) of sampling adequacy. KMO indicates whether or not variables can be grouped into a smaller set of underlying factors. Values obtained in this test range from 0 to 1. High values (close to 1) generally indicate that a factor

analysis may be useful with your data. If the values are less than < 0.5, the results of the factor analysis probably will not be useful. The results of our KMO test gave a value of 0.749. This value is higher than 0.5 indicating that our data can be grouped using factors analysis. We used confirmatory factor analysis with PCA to test our indicators. This is because our aim was to verify the correctness of already identified IFA indicators.

4.3 Identification of the Indicators of each Category using Factor Analysis

Factor Analysis is a statistical approach that can be used to analyze interrelationship among a large number of variable and explain these variables and in terms of their common underlying dimensions (factors). The statistical approach involves finding a way of condensing the information contained in a number of original variables into smaller set of factors with minimum loss of information (Centre for International Development, 2001). The procedures of this classification as well as the related Cronbach's Alpha coefficient (α) are described to show the reliability in Tables 4 to 7. Cronbach's Alpha coefficient α of >=0.5 is within acceptable limit while α >=0.9 is excellent.

4.3.1 Identifying Network Policy (NP) Indicators.

Network Policy relates to ICT environment such as policy strategy, business environment and resource availability, particularly economic factors. There is need for competitive and conducive policy environment or climate. Principal Component Analysis is a factor analysis method that provides unique solution, so that the original data can be reconstructed from the results. It looks at the total variance among the variables, so that the solution generated include as many factors as there are variables. Applying the Principal Component Analysis, Table 4 indicates the network policy category is divided into three components which are the indicators of this category.

Table 4: Rotated Component Matrix of Network Policy

Questions	ICT policy and strategy indicator	ICT financing indicator	ICT human capacity Indicator
NP1			0.858
NP2		0.938	
NP3	0.858		
NP4	0.904		
NP5	0.898		
NP6	0.825		
NP7	0.819		
NP8	0.825		
NP9			0.745
NP10		0.818	
NP11	0.918		
NP13	0.868		
NP14	0.830		
NP15	0.895		

The factor analysis resulted to the three indicators which are discussed below.

Network Policy (NP) consisted of three indicators namely Institutional ICT Policy and Strategy (α =0.97), ICT Human Capacity (α =0.61) and ICT Financing (α = 0.78)

ICT Policy and Strategy addresses strategic planning for ICT, the Champion of ICT and the organizational structure, regulations and impediments on business enterprise growth and e-commerce. An organization need to have ICT policy strategy that suits their business and plan that is tightly linked to corporate strategic plan and opportunities. On the other hand, ICT Financing (Economic Environment) Indicator measures the degree to which an institution has sufficient budgetary allocation and other resources to adopt and use ICT. The framework defines ICT budget allocation and the source of organizational ICT budget and resources. ICT Human Capacity (Business Environment) Indicator measures the degree to which an institution has competent and well trained ICT professionals and support staff to execute e-business tools.

Table 5: Rotated Component Matrix of Network Access

Questions	Infrastructure indicator	Access to services indicator
NA16	0.872	
NA17	0.834	
NA18	0.840	
NA19	0.797	
NA20		0.747
NA21		0.712
NA22	0.771	
NA23		0.882

4.3.2 Identifying Network Access (NA) Indicators

Applying the Principal Component Analysis as Extraction Method the Network access was divided into two indicators namely infrastructure and Access to services. Tables 5 illustrate the results of factor analysis.

Network access is conditions related to enabling physical connectivity. Proper functioning and affordable communication networks are therefore essential conditions for the development of e-business, particularly e-banking.

Infrastructure is measured using internet availability, network speed and quality, hardware and Software. The Questions 16, 17, 18, 19, and 22 loaded to the Infrastructure indicator and the reliability α = 0.9 is excellent of this classification.

Access to necessary services Access to Services Indicator Consisted of questions 20, 21, 23 with reliability of 0.5477. This refers to how we use connectedness to make it meaningful and purposeful especially its ability to adopt and use ICT. The Network World is all about how we are able to adopt and use the Network to make our lives better, jobs more meaningful, time more well spent, people smarter and communications stronger, healthier and safer.

4.3.3 Identifying Networked Society (NS) Indicators

Applying the Principal Component Analysis, Table 6 indicate the networked society category was divided into three representative indicators namely Clients and MFIs, online (question 24, 28), ICT in everyday life (question 25, 27 and 31) and ICT in the MFIs (work place) (question26, 29, 30) as shown in Table 6 .

Table 6: Rotated Component Matrix for Networked Society Category

Questions	ICT in the MFIs	ICT in everyday life	Clients and MFIs online
NS24			0.777
NS25		0.811	
NS26	0.694		
NS27		0.872	
NS28			0.840
NS29	0.786		
NS30	0.881		
NS31		0.501	

Networked Society (NS) consisted of three indicators. The reliability of this classification through calculation of Cronbach's alpha is as follows, Clients and Microfinance Institutions Online ($\alpha = 0.55$), ICTs in Everyday Life ($\alpha = 0.63$), and ICTs in the Microfinance Institutions Institution ($\alpha = 0.72$).

Clients and MFIs Online - As more MFIs gain an online presence, it becomes more likely that the clients will also adopt and use ICTs to carry out their activities and needs. One of the key drivers of online growth is availability of affordable technology, adaptability and awareness. Here sub-indicator is demographics of internet use by MFIs and clients.

ICT in Everyday Life**,** Clients participate more directly in the networked world when information devices, such as telephones, computers and radios, etc. are generally and culturally accepted and incorporated into daily life. Here the sub-indicators are clients or family member owning phone or computer or any electronic device use for payments or communications in daily life activities such as access and use of computers, computer village centre's and cybercafés, etc. In communities where income or infrastructure cannot support high levels of individual access to ICT for everyday life like in Kenya, cybercafés and computer network village centre as those proposed by the Government provide a much-needed alternative.

ICT in MFIs (work place) - It measures readiness and usage of ICT at work, which includes use of e-mail and internet for internal and external communications and official duties.

4.3.4 Identifying Networked Economy (NE) Indicators

Applying the Principal Component Analysis Table 7 indicate that networked category was divided into three representative indicators, namely, ICT Employment opportunities, Payments and e-banking.

Table 7: Rotated Component Matrix of Networked Economy

Questions	E-banking	Payment channels	ICT employment opportunities
NE32			0.797
NE33		0.897	
NE34	0.837		
NE35		0.872	
NE36			0.782
NE37	0-.829		
NE38	0.569		

Networked Economy (NE) consisted of three indicators. The reliability of this classification through calculation of Cronbach's alpha is ICT Employment (α =0 .79), Payments (α =0 .81), and E-banking =0.71).

ICT Employment Opportunities, A thriving economy means good business for business enterprises hence a thriving job market for ICT professionals provided added incentive for growth of ICT adoption and overall adoption and use of ICT within the organization for value added services and exploitation of emerging opportunities.

Payment Systems, Electronic payments options by financial institutions and/or retail options enhance clients' choice and access to services and products. They also allow businesses to reduce costs associated with physical infrastructure and transaction costs. Electronic payments such as telephony delivery channels such as M-PESA by Safaricom and Zap by Zain in Kenya, internet and point of sale devices, among others, are specific payments opportunities

E-banking arises when financial institutions adopt and us modern and innovative ICT based payments systems and electronic transactions channels in the provision of banking business (savings, lending, money transfer, etc.). In this case, the opportunities include provision of e-banking by MFIs using ICT driven delivery channels and methodologies. ICT enabled services in the provision of financial services range from operational processes thus reducing drastically paper-based process to paperless; to service delivery through electronic means such as the adoption and usage of ATMs, POS, mobile phones, third party agents and card-based transactions. When organizations move their dealing with other organizations online, they can often communicate more easily at lower costs; hold smaller inventories and process payments quickly, among other advantages.

Network Policy, Network Access, Networked Society, and Networked Economy are the four categories which determine the overall level of e-Readiness using the developed Integrated Framework (IFA). The categories are divided into their indicators by factor analysis. The Categories as well as their related indicators reliability (α) are presented briefly:

i. Network Access (NA) consisted of two indicators Access to Services (with α = 0.54) and Infrastructure (with α = 0.90).

ii. Networked Economy (NE) consisted of three indicators ICT Employment (α = 0.79), Payments (α = 0.81), and E-banking (with α =0.71).

iii. Networked Society (NS) consisted of three indicators Clients and Microfinance Institutions Online (α = 0.55), ICTs in Everyday Life (α = 0.63), and ICTs in the Microfinance Institutions Institution (α = 0.72).

iv. Network Policy (NP) consisted of three indicators namely Institutional ICT Policy and Strategy (α = 0.97, ICT Human Capacity (α = 0.61) and ICT Financing (α = 0.78)

4.4 The Proposed Framework

The testing of the proposed framework was done using regression analysis. For each of the variables we checked the value in the columned significant. This tells whether this variable is making statistically significant unique contribution to the equation. This is very dependent to which variables are included in the equation and how much overlap there is among independent variable. If the p value (p) is less than .05 (<.05), then it is making a significant unique contributions to the prediction of the dependent variable in this case category.

The following indicators as shown in Table 8 are in making significance contribution to e-readiness of microfinance institutions Access to services, Infrastructure, policy &strategy, human capacity, ICT in daily life, ICT in Microfinance Institutions work place, Employment opportunity, Payments, while three indicators namely ICT financing, clients & Microfinance Institutions online and E-banking show their the contribution is insignificant.

Table 8: Regression Analysis Results

CATEGORY	INDICATOR	P VALUE(p)
NA	NA Access to services	0.012
	NA Infrastructure	0.000
NP	NP policy &strategy	0.000
	NP human capacity	0.005
	NP financing	0.08
NS	NS clients & Microfinance Institutions online	0.282
	NS ICT in daily life	0.020
	NS ICT in Microfinance Institutions work place	0.002
NO	NO Employment opportunity	0.001
	NO Payments	0.002
	NO E-banking	0.316

Microfinance Institutions Network Access e- readiness is positively influenced by Access to Services (p=0.012), and Infrastructure (p=0.000). This means that Microfinance Institutions Network Access readiness will improve if Access to Services and Infrastructure of the internet are enhanced. Microfinance Institutions Network Policy readiness is positively influenced by ICT Policy and Strategy (p=0.000) and Human Capacity (p=0.005). This means that a good Policy and Skilled Human Resource will increase the use of technology by Microfinance Institutions in Kenya. Networked Economy readiness is positively influenced by ICT Employment Opportunity (p=0.001) and Payment opportunities (p=0.002) meaning increased Employment Opportunity by Microfinance Institutions will increase the demand for technical computer staff. Payment Opportunities increase the use of delivery/payment channels thus increasing the Microfinance Institutions Networked Economy. Networked Society readiness is positively influenced by ICT in Everyday Life (p=0.020) and ICT in Microfinance Institutions Workplace (p=0.002). This implies as there is increased use of ICT in Everyday life and in Microfinance Institutions (workplace) there is increased Networked Society.

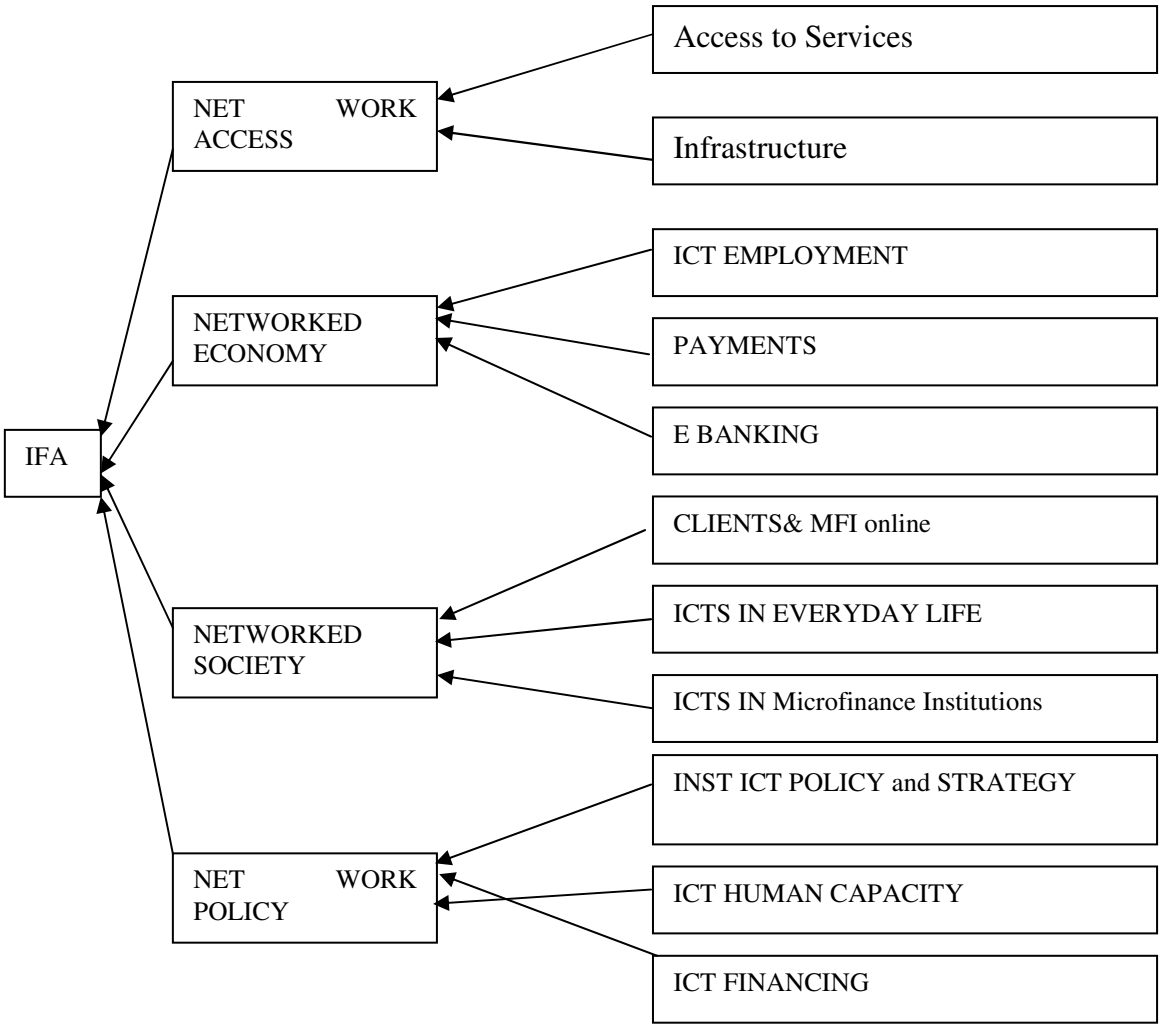

Figure 2: The Categories and Indicators of the IFA

Network Economy e-Readiness is not significantly affected by E-banking (p=0.316). This means that a decrease in E-banking activities will not be a significant decrease Networked Economy readiness. This can be due to the current situation where many Microfinance Institutions are not involved in many banking services; the e-banking sector in Kenya is not mature. Networked Society readiness is found not to be significantly influenced by Clients Online (p=0.282). This means if the clients use of Internet decrease, Networked Society e-Readiness significantly will not slow or decrease. This can be attributed to low Internet penetration in Kenya especially in the rural. Network Policy readiness is not significantly influenced by ICT Financing (p=0.08) meaning that the MFI Network Policy readiness will not decrease significantly due to a reduced ICT Financing. The budget allocation of ICT project is not adequate and ICT has not been recognized as a key sector in many organizations. In summary these three indicators may not cause significant changes to their respective categories. According to this framework an organization should possess some qualifications to get e-ready. These qualifications were proved by satisfying the boundaries of four categories as Key Performance Indicators as shown Figure 2.

4.5 Validating the IFA Framework.

The IFA framework was evaluated by using it to assess the e-Readiness level of a number of sampled Microfinance Institutions. To arrive at the sample, we used the alphabetical list of the Microfinance Institutions. The alphabetical list had fifteen Microfinance Institutions; we picked the first, the sixth, and the fifteen. For purposes of privacy, the sampled Microfinance Institutions were coded “Case study 1” to “Case study 3”.

The staging was done using the Verdict tool which is a diagnostic tool. Using the Verdict diagnostic e-readiness framework makes it easy for the results to be used at an institutional ICT strategy development level and to monitor progress of ICT strategy implementation (Aminali, 2007; Ruikar, 2004).

4.5.1 Case study 1: Microfinance Institution 1

The average e-readiness of all the indicators of the first microfinance institution is shown in Figure 3. The network policy category three indicators ICT financing, ICT strategy and human capacity have a sore of above 4.0 which is e-ready. This shows the internet bandwidth is a big percentage of the institutional operational budget.

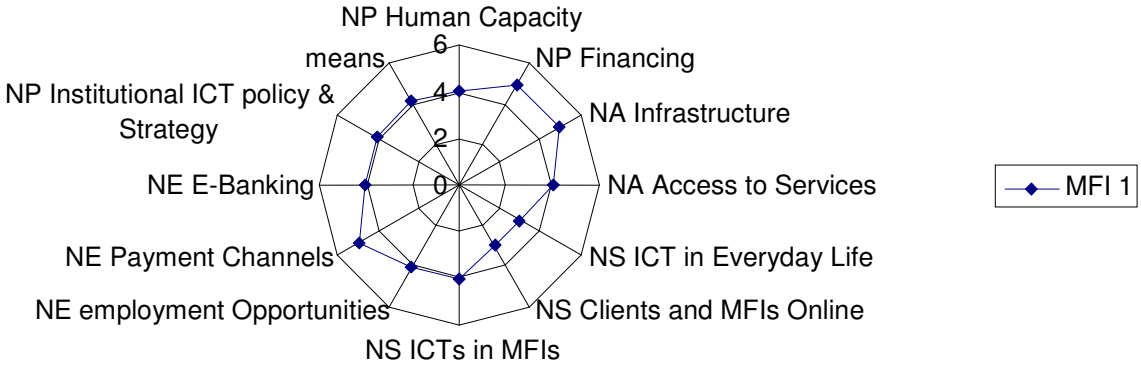

Figure 3: E-Readiness for Indicators of Microfinance Institution 1 (MFI 1)

The institution also has its ICT strategy aligned to the corporate strategy. A score of above 4.0 in the human capacity indicator shows that the institution has competent and well trained ICT professionals and support staff to execute e-business tools. This institution economic and business environment are favorable. The networked economy category of indicators namely E-banking, payment channels and employment opportunities have a score of > 4.0 which is green. This means the institution has not automated services offered to clients. This show the MFI indicators are all ready. The ICT is being utilized within the institution and also to support clients. This can be due to discouragement by increased cases of cyber insecurity in the Banking sector.

The results show that the microfinance institutions 1 illustrated by figure 4, scored 3.1 for infrastructure indicator and score above 3.5 for access to services. This means that the institution has adequate number of networked computers for the employees. Beyond the availability of affordable, high-quality basic communication services e-business will also depend on the capacity, availability and pricing of value-added services which provide applications such as access to the infrastructure, and content hosting. The more affordable the access to these services the greater the penetration. These services are provided by internet service Providers (ISPs). The employees found the internet fast and reliable.

The networked society category indicator ICT in MFIs online have a score of average 4.0 which is green indicating that the organization structures are e-ready. This means that it has an online presence, making it possible itself for its clients to also adopt and use ICTs to carry out their activities and needs. ICT in everyday life and clients and MFIs online indicators are at 3.2 which is amber. This means that the MFI clients and staff are using internet for communication and also other services.

Case study 1 E-readiness of categories is shown in figure 4. The level of e-Readiness is GREEN in three categories namely network access, network society and network policy. The networked computers and adequate infrastructure, the network environment is also favorable meaning the institution ICT financing is enough and staff have the relevant skills.

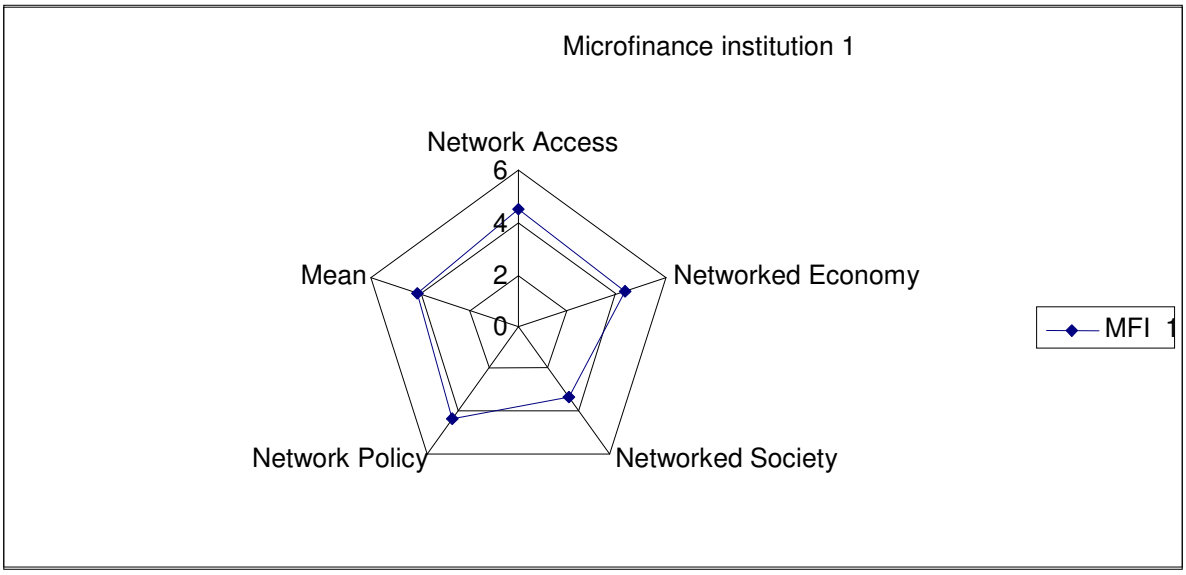

Figure 4: E-Readiness for Categories of Microfinance institution 1 (MFI 1)

The networked economy is in amber stage which can be linked to two of its indicators not being e-ready. The overall e-Readiness of first microfinance institution from the means of the categories is 4.0 indicating that it is e-ready as shown in Figure 4.This institution is registered under the Microfinance Act.

4.5.2 Case Study 2: Microfinance Institution 2

The average e-readiness of all the indicators of the second microfinance institution is shown in Figure 5. The network policy category three indicators ICT financing, Institutional ICT strategy and human capacity have a score of 3.0, 3.0 and 2.0 respectively which are not e-ready. This shows the internet bandwidth is a small percentage of the institutional operational budget. Internet bandwidth cost in Kenya is very high hence such a budget allocation means the institution is purchasing less than 128 kb/s which can't support efficient mobile banking services which is one of the clients need. The human capacity indicator shows that the institution doesn't have competent and well trained ICT professionals and support staff to execute e-business tools. The institution also has not aligned its ICT strategy to the corporate strategy. This could be due to lack of competent skills among the staff. The institution economic and business environment are unfavorable.

The networked economy category of indicators namely E-banking, payment channels and employment opportunities scored 3.0, 1.0 and 3.0 respectively. This means the institution has not automated services offered to clients. The ICT is being utilized within the institution and also to support clients. This can be due to discouragement by increased cases of cyber frauds in the Banking sector.

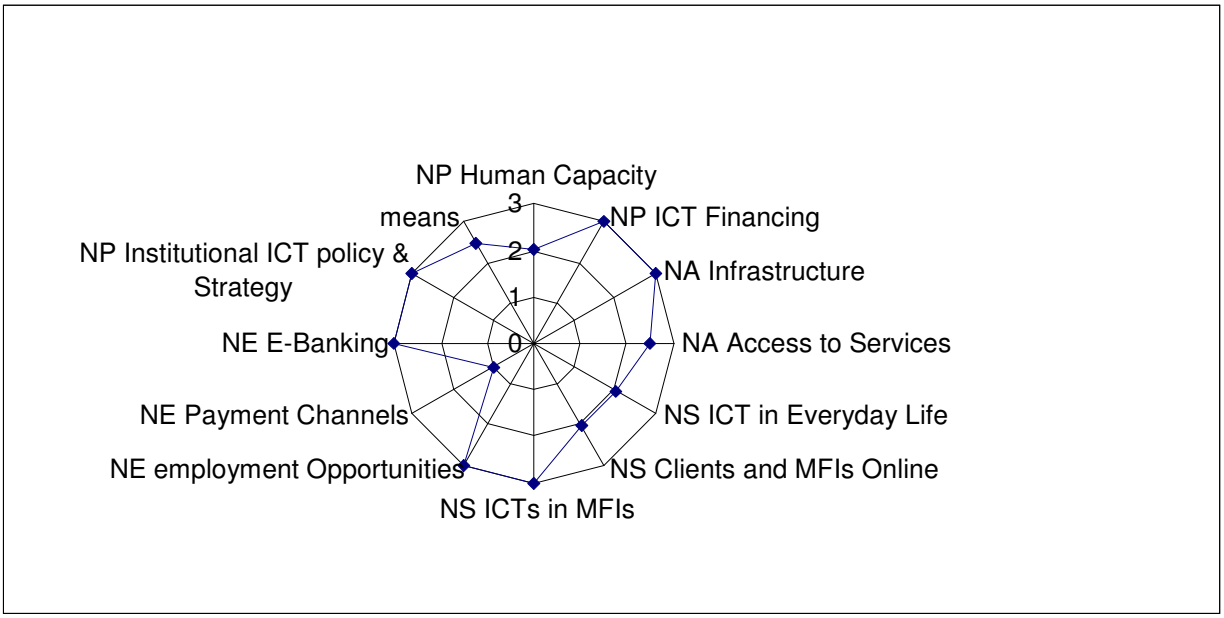

Figure 5: E-Readiness for Indicators of Microfinance Institution 2 (MFI 2)

The networked access category indicators scored 3.0 for infrastructure indicator and score above 2.5 for access to services, indicating amber. This means that the institution has average number of networked computers and access to telephone service by the employees. The more affordable the access to these services the greater the penetration. This means for the employees to be satisfied there is need to increase speed of network and quality of services.

The category of Network Society indicators ICT in everyday life, clients and MFIs online and ICT in MFI scored average 2.0, 2.0 and 3.0 respectively. This means ICT in everyday life, client's indictors are not e-ready. There is need to increase its online presence by having interactive website so that the clients can access information online as most of the clients have mobile phones which they can use. The ICT in MFIs is average, 3.0, amber stage.

Microfinance Institution 2 has the categories of Network Society and Networked Economy in the RED region of the VERDICT boundaries as shown in Figure 6. This indicates a low level e-readiness meaning there is urgent need to address several indicators aspects to achieve e-Readiness. The other two categories, i.e. Network Access and Networked Policy were found to be in the Amber region. The overall e-Readiness from the means of the categories gives a value of 2.52, indicating that this organization has a medium level of e-readiness implying that several categories aspects of e-Readiness such as network access and networked Policy are average, while network society and networked economy are serious intervention areas. Microfinance Institution 2 is registered under the NGO Act.

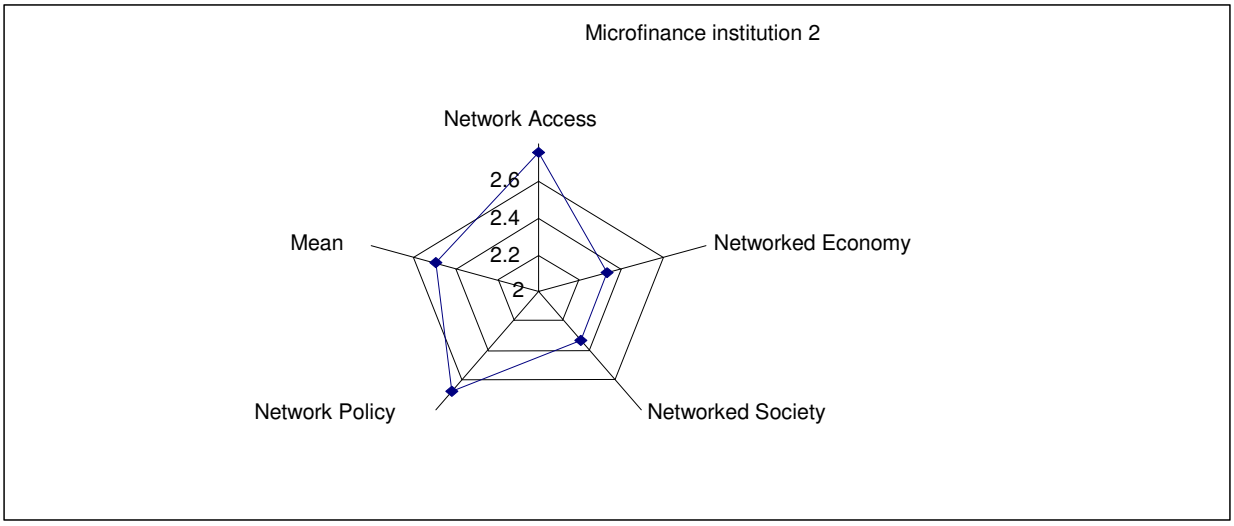

Figure 6: E-Readiness for Categories of Microfinance Institution 2

4.5.3 Case study 3: Microfinance Institution 3

The average e-readiness of all the indicators of the microfinance institution 3 is shown in Figure 7.

The network policy category three indicators ICT financing, Institutional ICT strategy and human capacity have a score of 2.0, 3.0 and 1.0 respectively which are not e-ready. This translates to a small or no percentage of the institutional operational budget is dedicated to internet bandwidth. The human capacity indicator shows that the institution doesn't have competent and well trained ICT professionals and support staff to execute e-business tools. The institution also has not aligned its ICT strategy to the corporate strategy. This could be due to lack of competent skills among the staff. The institution economic and business environment are unfavorable.

The networked economy category of indicators namely E-banking, payment channels and employment opportunities scored 2.0, 1.0 and 3.0 respectively. This means the institution has not automated services offered to clients. There is little utilization of ICT within the institution and also to support clients. This can be due to discouragement by increased cases of cyber insecurity in the Banking sector.

The networked access category indicators scored 2.0 for infrastructure indicator and score above 1.5 for access to services, indicating not ready. This means that the institution number of networked computers and access to telephone service by the employees is not adequate. The category of Network Society indicators ICT in everyday life, clients and MFI online and ICT in MFI scored average 2.0, 1.0 and 4.0 respectively. This means ICT in everyday life, clients indicators are not e-ready. There is need to increase its online presence by having interactive website so that the clients can access information online as most of the clients have mobile phones which they can use. The ICT in MFI is very e-ready.

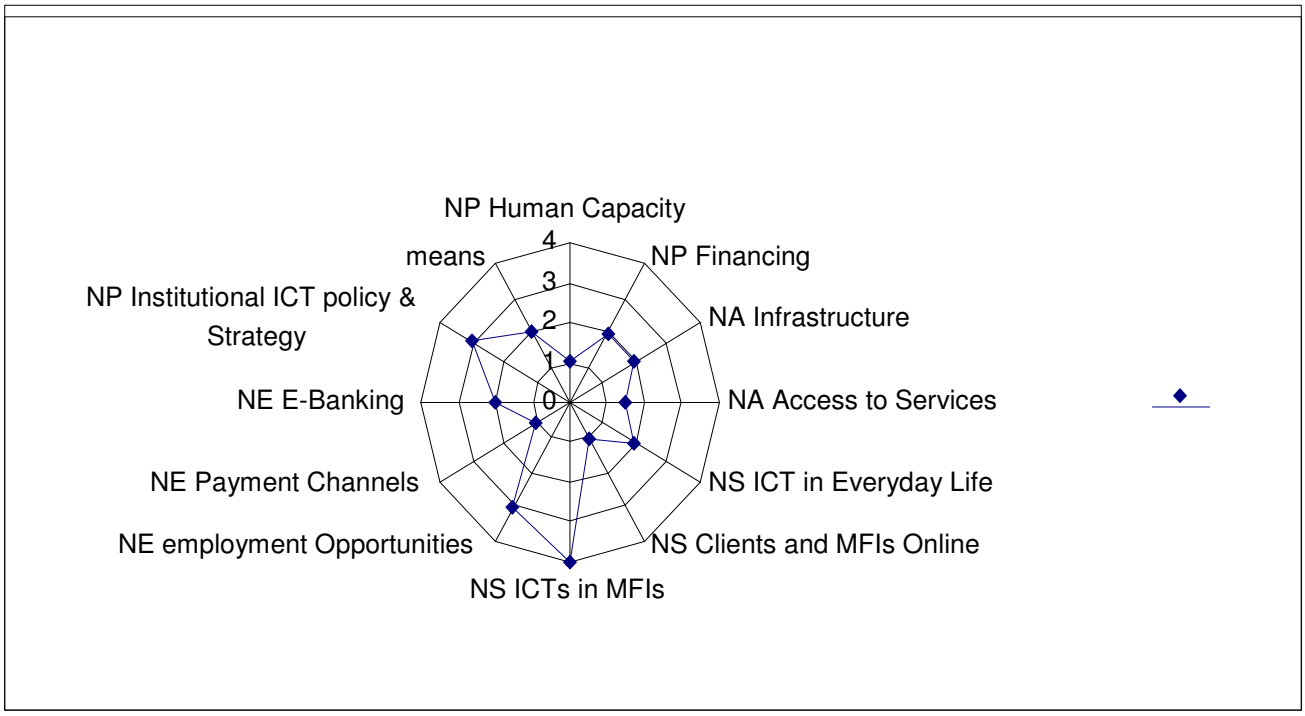

Figure 7: E-Readiness for Indicators of Microfinance Institution 3 (MFI 3)

The result in Figure 8 shows that Microfinance Institution 3 is in the RED category of the VERDICT boundaries in all the categories of measuring e-Readiness. This indicates that for the institution to be e-ready, there is urgent need to improve in all the major categories of Network Policy, Network Access, Networked Society and Networked Economy. The overall e-Readiness of Microfinance Institution 3 determined from the categories means is 2.42. This falls in the RED region indicating that there are many intervention areas to be addressed to achieve e-Readiness.

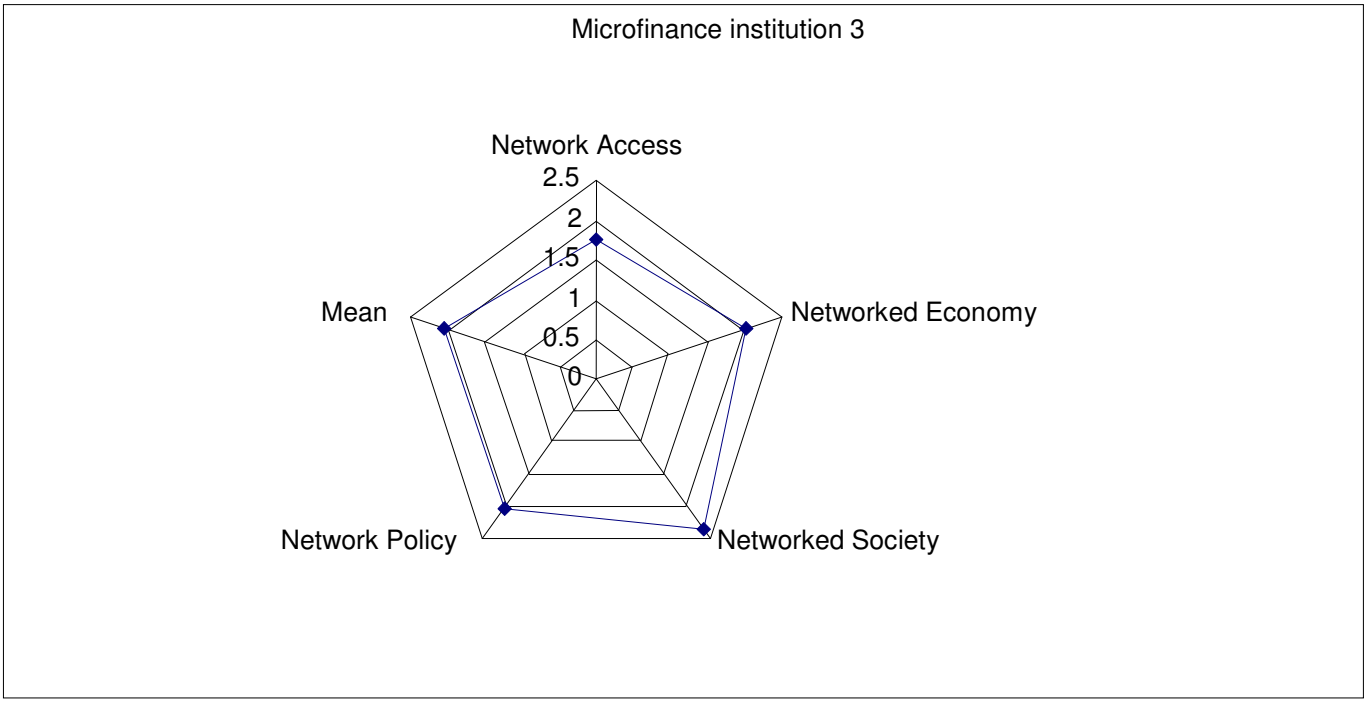

Figure 8: E-Readiness for Categories of Microfinance Institution 3 (MFI 3)

The results of investigation of a cross-section of Microfinance Institutions in Kenya show the statements about the overall level of e-readiness in the industry.

The industry has a medium level of e-readiness in two categories of network access and network policy, a low level e-readiness in networked economy and networked society. It means that having an average score range from 2.5 to 3.5 in two categories and average score range from 0 to 2.5 in two categories, the industry has an "Amber" position due to VERDICT's boundaries. More attention is needed for most of institutions to be completely e-ready.

Among those investigated categories, the industry has better position of e-readiness in "networked access" since the average scores of this category is higher than other categories. In MFIs "networked Economy" is the least e-ready category with the lowest score compared to all categories. Since that is low level e-readiness it means several aspects of this attribute needs urgent attention for the industry to achieve a proper position of e-readiness.

5. Conclusion

Using some common characteristics of questions in each category, we applied factor analysis to classify each category into some indicators. We investigated different combinations of indicators of each category to make a proper structural framework in order to demonstrate importance and relationships among the indicators and categories of IFA framework respectively. To achieve accurate results it was done using regression analysis and correlation matrix procedures. The specific indicators selected for populating the framework emerged from basic and initial probes of association and correlation yielding 'groups' of like-factors. The developed framework was validated using a sample of three microfinance institutions in Kenya.

Since it is understood that e-readiness is just a new concept in Microfinance Institutions industry and it will be fascinating to investigate, further research to study on the barriers and benefits that Microfinance Institutions may face at first stage of getting ready to apply new technologies (ICTs) and also the requirements that an MFI need to meet in this regard. Besides, investigation of the e-readiness level from the MFIs institution point of view, it would be interesting to explore how e-ready the Microfinance Institutions clients to use technologies in facilitation of interactions between an MFI and the client.

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