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Analysis of the Effects of Policies of Microfinance Institutions on the Technological Capabilities of Micro-borrowers in Nigeria

Kalu O. Oji, Ph.D*

A study was conducted to determine the effects of Microfinance institutions' policies on the technological capabilities of micro-borrowers in Nigeria. Nine (9) Microfinance institutions and 250 of their clients were surveyed in 2005 and 2006. The findings showed that between 2001 and 2005 there were significant growth in the clientele, savings, and loans made by the MFIs reflecting increasing demand for microfinance services. The regression results showed that the technological capability of micro-borrowers were affected by the number of employees/workers, duration of their loans, age of major machinery/ equipment of the enterprise, and the degrees of appropriateness of the machinery/ equipment to workers' skills, and available infrastructure. The operator's length of experience, and interest rate on MFI loans negatively influenced technological capability. In order to encourage technology accumulation through micro-financing, MFIs should increase the duration of clients' loans, spread the repayment over a longer period, and increase the moratorium as well as introduce low-interest loan products for technology acquisition.

Keywords: Microfinance, Technological capability, Micro-borrowers, Micro-enterprises

JEL Classification Numbers: G21, O33, O17.

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I. Introduction

The clients of microfinance institutions (MFIs) are usually small-scale operators and firms in the informal sector of the economy. These operators are usually engaged in a variety of activities ranging from artisanship, weaving, metal-working, furniture-making, soap-making, crafts, shoes production, automobile mechanics, petty-trading, food-processing, agriculture, etc., using simple technologies. They flexibly

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employ simple implements and tools, a few employees, mostly household members, and a small capital base to produce limited volume of output (Aluko et al, 1972; Odo, 1994). The micro-producers are usually of low educational level, and skills acquisition and accumulation is largely by traditional apprenticeship characterized by learning-by-observation-and-doing. Enterprise ownership is mostly dominated by sole-proprietorship, or owner-operated forms based on apprentice or household labor. The major objective of these micro-entrepreneurs is largely to secure subsistence, and to save any little surplus for future consumption needs - a form of insurance. Consequently the prospect of expanding production and investment from own-generated resources is almost secondary. However, these enterprises can respond to incentives and opportunities to improve their capital base and technology. Eboh (2002) showed that even though the average annual rate of expansionary investment among artisans in South-Eastern Nigeria was abysmally low, less than 5%, they showed generally high willingness to expand their capital base, operational performance and overall enterprise growth. This was reinforced by the observation that over 80% of the artisans indicated willingness to continue self-enterprise rather than fold up for paid public or private employment.

The major means of injecting capital and technology to micro-producers is usually through the provision of *micro-credit*. Micro-credit is the delivery of credit services, usually small loans to the poor and other low-income people lacking access to formal banking institutions and services (Seibel, 2003; 2004; Rogally, 1999). However, the peculiar economic characteristics and requirements of this category of borrowers require that credit should be accompanied by savings products, supervision, advisory services, training, and other services. The provision of credit alongside these other services constitutes *micro-finance*, and the process is referred to as *micro-financing* (Mirero, 2004). According to Nweze (2001) and Zeller *et al* (2001) micro-finance is a term referring to the provision of a variety of services such as small loans, saving facilities, and other financial services designed for people excluded from conventional financial services on account of lack of collaterals, illiteracy, etc. The institutions engaged in delivering microfinance services to the poor or low-income operators are known as *Microfinance Institutions* (MFIs). Microfinance institutions can be banks or

non-banks. Under the New Microfinance Policy in Nigeria (CBN, 2005), bank MFIs are registered as Microfinance banks and regulated by the Central Bank of Nigeria, while registered non-bank MFIs are only required to forward periodic returns on their activities to the CBN.

Eboh (2002) noted that the urban micro-enterprise sub-sector in Nigeria is characterized by low capital intensity and predominance of domestic resources; hence it provides an amenable medium of economic participation by many poor people. These micro-enterprises represent a source of subsistence, employment, and income for their owner. Poverty is a major problem among micro-operators. Poverty and the limited income imply that they lack capital to expand their operations. Thus, the provision of microfinance services represents a major strategy for poverty alleviation among the enterprising poor.

Several microfinance schemes provide loans to enable potential entrepreneurs start small-scale enterprises; unfortunately, these schemes only provide subsistence living for the proprietor or beneficiary with no possibility of providing jobs for others in the community. To provide jobs for others as well as improve the living conditions of the operators, microfinance schemes should be able to upgrade the activities of the operators from subsistence living to small-scale enterprises through the injection of technology into their operations. The injection of technology enables the operator to improve efficiency and expand the scale of production, thereby employing more people. Technology plays a vital role in the transformation of the activities of micro-operators as it can improve the rate of adoption, level of productivity, and income of the operation. In spite of this realization, there are no documented studies to guide the injection of technology through micro-financed schemes. Available studies such as Eboh (2002), Ezenwe *et.al.* (2001), Adeboye and Clark (1995) were largely concerned with identifying the determinants of technological accumulation and technological learning with no indication of how technology can be injected into firms through market-based policies. This study was intended to contribute information about policies to guide the technological upgrading of firms by microfinance schemes in the country. Accordingly, the objective of the study is to determine the effects of the

policies of microfinance institutions on the accumulation of technological capability by their small-scale operator-clients. This study is crucial to the realization of one of the objectives of the New Microfinance policy in Nigeria (CBN, 2005: p. 9), which seeks to “promote synergy and mainstreaming of the informal sub-sector into the national financial system”. This is because a clearer elaboration of the policy constraints and opportunities in the non-governmental organization MFI sub-sector would promote interventions for the eventual up-scaling of these institutions to Microfinance Banks. Moreover, one of the strategies under the new microfinance policy is to “promote the establishment of NGO-based microfinance institutions” (CBN, 2005: p. 9).

The paper is structured as follows. Following this introduction, section two presents a review of the literature on microfinancing and technological capability; while section three discusses the methodology adopted. Section four presents the results and recommendations, while section five concludes.

II. Literature Review

II.1 Conceptual Issues in Micro-Financing for the Poor

The concept of microfinance is best captured in the title of the book by F.A. J. Bouman (1990) – “Small, Short and Unsecured”. Microfinance started as micro-credit which is the provision of very small loans that are repaid within short periods of time, and is essentially used by low-income individuals and households who have few assets that can be used as collateral. Microfinance is defined as the financial products and services that are targeted towards the poor (Mirero, 2004). It is the target to which the finance is directed that differentiates it from other financing schemes. At present microfinance includes such services as micro-credit provision, micro-savings/other deposit instruments, micro-insurance and money transfer. Consequently, microfinancing refers to the business of accessing or providing financial services to the poor. The poor are defined here as those who require financial services but lack accessibility to conventional services providers like commercial banks for reasons such as (i) lack of

conventional collaterals to secure loans; (ii) failure to meet minimum terms and conditions required for opening and operating different bank accounts; (iii) physical inaccessibility of banks due to their location in far away distant urban centers; and (iv) inappropriate services provision documentation and tools for microenterprise operators.

The aspect of microfinance that has contributed most to its growth and popularity is its “credit-plus” approach. Under this approach the focus is not only on the provision of adequate and timely credit to low income operators, but there is an attempt to integrate credit with other developmental activities such as community organizing and development, leadership training, skills and entrepreneurship development, financial management, and social mobilization (www.gdrc.org/virtual_library; Oji, 2006). In most cases the success and sustainability of micro-finance schemes have depended upon, and were fostered by these other aspects.

Most low income individuals lack access to commercial bank loans for several reasons. In such circumstances, access to microfinance services affords low-income groups the opportunity to obtain loans for their economic activity. Microfinance services are usually tailored to the needs of the poor. Programs and organizations that provide credit to low income groups often have to make a clear match between the quality and quantity of credit, and the capacity and ability of the poor to utilize the credit, and at the same time being organizationally sustainable. Thus, the loans have to be tailored to the needs, capacities and abilities of the poor. This is unlike government credit programs and formal bank credit that emphasize large loans for long repayment periods at low interest rates. Microfinance loans, on the other hand, are for short periods, repaid quickly, and made available at interest rates that keep the program sustainable and viable.

II.2 Role of Microfinance Institutions (MFIs)

Microfinance institutions are generally regarded as institutions whose *major* business is the provision of microfinance services. By definition, microfinance institutions (MFIs) are semi-formal, non-governmental and community development organizations involved in rural development (Mark, 2001). They render both financial (credit) and non-financial services to their

members, mainly the rural poor, who are usually women. They are legal entities and are mostly registered as not-for-profit companies limited by guarantees. Consequently, they can sue and be sued under their name. They usually have Board of Directors or Board of Trustees as the case may be. These Boards comprise either only the founders or elected member delegates to the board. With respect to their services, they are involved in savings mobilization and loans. Their loanable funds are in high demand and constitute the main source of revenue for the organization.

Microfinance institutions offer microfinance services to the poor. By definition microfinance is the supply of loans, savings, and other basic financial services to the poor (Robinson, 2001). The size of the loan is usually small and varies from one institution to the other. In Nigeria the size is usually in the range of x5,000 to x50,000 (about: \$35 to \$350) (Oji, 2005). The type of enterprise involved and the market or population, to a large extent, determine the actual size of loans. Savings mobilization requires either a banking license (which none of the NGO MFIs have) or the status of a primary or secondary society (which are legally permitted to mobilize savings from members only).

Most MFIs operate outside the legal regulatory framework. The repayment rates of MFIs are generally considered high and within acceptable limits, and in some cases as high as 90 % or more (Rashid and Chordhory, 2001). Their viability is sometimes enhanced by the substantial donor funds received. The dominant MFIs in Nigeria are The Farmers Development Union (FADU), Ibadan, Oyo State; Country Women of Nigeria (COWAN), Ondo State; Justice Development and Peace Commission (JDPC), Ijebu-Ode, Ogun State; NALT-United Self-Help Organisation (NUSHO), Nsukka, Enugu State; Development Exchange Centre (DEC), Bauchi, Bauchi State; Lift Above Poverty Organisation (LAPO), Benin City, Edo State; Save and Produce (SAP), Jos, Plateau State; Peace Development Centre (PDC) Uyo, Akwa-Ibom State; Self-Reliance Economic Advancement Program (SEAP), Ilorin, Kwara State; and Outreach Foundation (OF), Lagos, Lagos State (Onyeagocha, 2004). All the MFIs listed above participated in the UNDP Microstat (Nigeria) program with the exception of COWAN and FADU. The Microstat Global pilot program was initiated by UNDP because of the huge demand for microfinance services.

Globally it is estimated that about 500 million households have demand for microfinance services and only about 2.5% of these are currently reached by microfinance programs (Rhyne and Donahue, 1999). In order to meet this global demand, countries were encouraged to set up micro-stat projects. Furthermore, new institutions were encouraged to initiate services, while young and promising institutions are encouraged to scale up their activities. The aim is ultimately to build a new generation of MFIs with solid institutional base, financial performance and transparent track record. The UNDP MicroStat Nigeria program started operations effectively in September/October, 2000 (Onyeagocha, 2004).

The Self-Help Groups (SHGs) which perform similar functions as the semi-formal institutions are also microfinance institutions but are classified as informal microfinance institutions. The formal MFIs include the Development Finance Institutions (DFIs), Community/Microfinance Banks (CBs) and commercial banks. Consequently there are four types of MFIs, namely, the non-governmental organization (NGO) MFIs, government-supported MFIs or Development Finance institutions, Private sector-operated MFIs such as commercial and community/microfinance banks and Co-operative societies, and informal sector MFIs or SHGs.

Although several organizations are involved in microfinance activities, the definition of micro-finance institutions adopted in this work is that MFIs are semi-formal, non-governmental and community development organizations involved in rural development by rendering both financial (credit) and non- financial services to their members, mainly the rural poor. They are legal entities and are mostly registered as not-for-profit companies limited by guarantees. This definition tends to exclude the informal self-help groups whose activities and policies are un-coordinated and may even be difficult to identify. It also excludes the microfinance activities of development finance institutions (DFIs) and private-sector operators such as commercial/community banks because their objectives are not primarily to serve the poor and their policies are not independent of the heavy regulation imposed by the financial system. *This definition helps us to focus on institutions that were primarily set up to help the poor and whose policies are independent of the financial system.* This focus is important in order to avoid

confusion between the effect of Microfinance institutions' policies, and those of their regulators. It is within this context that we can assess the effect of MFI policies on their borrowers.

Rogally (1999) defined micro-credit as credit for self-employment, which is designed to enable the poor to have access to production capital. This is based on the premise that micro-credit will lead to investment, income, reinvestment and more income until the borrower is promoted out of poverty. Effective micro-credit policies are necessary to facilitate the transformation of microfinance schemes from subsistence living level of support (or micro-enterprises) to small-scale enterprises (SSEs) level of support. SSEs operators if appropriately supported have greater potentials for income generation and employment creation compared to micro-enterprises (MEs), and are therefore critical for the effective fight against poverty through financial intervention strategies and services of MFIs. The nature and level of financial services required by micro-entrepreneurs differ from that required by small to medium scale (SSEs to SMEs) entrepreneurs. While MEs mainly need working capital loans to increase business turnover, the SSEs/SMEs require both capital and fixed assets loans for production purpose. It is at the level of SSEs/SMEs that the linkages to appropriate technology in terms of production equipments/tools will make significant contributions to the fight against poverty through enhanced income and employment from SSEs/SMEs.

II.3 Technological Capability of Small Scale Firms

Technological capability refers to the ability of firms to make effective use of the technological knowledge in production, investment, and innovation. They are the capabilities needed to execute all the technical functions entailed in setting up, operating, improving, expanding, and modernizing the firm's productive facilities. (Oyelaran-Oyeyinka, 2003). They represent the complex of entrepreneurial, managerial, and technical skills needed to set up and operate industries efficiently over time. Thus, technological capabilities refer to the ability of firms to use existing technology to produce more efficiently, and to use the experience gained in production and investment to adapt and improve the technology in use.

According to Aw and Batra (1998) technological capability refers to the ability to adapt or assimilate technology imported from abroad and to incorporate the additional and distinct resources needed to manage and put to productive use the newly acquired technology. These additional resources include skills, knowledge, experience and institutional structures and linkages. Consequently, various authors have distinguished between different types of technological capabilities. In his taxonomy Lall (1990; 1992) proposed three main groups of technological capabilities of the firm notably: investment, production, and linkage capabilities. Investment capabilities are understood as the skills required to identify, prepare, design, set-up, and commission new investment projects, and the expansion of existing ones. Production capabilities cover all the skills required to run a plant efficiently and to improve over time. They involve three broad types of engineering functions, namely: process, product, and industrial functions. Linkage capabilities are the skills needed to transfer technology from one firm to the other (who may be suppliers, buyers, or competitors), or from service firms to manufacturing firm, and from the science and technology infrastructure to the industry or firm. In essence they are the skills required by the firm to take advantage of improved technological opportunities from other firms, from service providers (including credit providers), the industry, or from the national science-and-technology system.

Based on their studies of industrial dynamism and the resources needed to generate and manage it, Bell and Pavitt (1993; 1995) presented a more detailed classification, which makes a distinction between *production capacity* and *technological capability* as representing two different stocks of resources. To them, production capacity are the resources used to produce industrial goods at given levels of efficiency and input combinations while technological capability refers to the resources needed to generate and manage technical change, including skills, knowledge and experience, institutional structures and linkages. They also made a distinction between technical change and technological learning or accumulation. While the former encompasses any way in which new technology is incorporated into the production capacity of firms and economies, the latter refers to any process by which the resources for generating and managing technical

change are increased or strengthened. The fundamental difference in Lall's and Bell and Pavit's classifications appears to be in the time dimensions of the conceptions of technological capabilities. Lall was interested in the static concept of capability, while Bell and Pavit were more concerned with the dynamic aspects of technological capability.

Another important taxonomy of technological capabilities in the literature is that proposed by Ernst et al (1998). These authors defined and classified technological capabilities in six types of functions with great variety of knowledge and skills positioned as the core elements, which firms need for them to acquire, assimilate, use, adapt, change and create technology. These functions with their associated sequential order of priority are as follows: production capabilities, investment capabilities, minor change capabilities, strategic marketing capabilities, linkage capabilities and major change capabilities (Oyelaran-Oyeyinka, 2003). An important denominator to all these conceptions of capability is that they all refer to *knowledge*, *skills*, and *experience* as core elements of technological capability.

II.4. The Effect of Policies on Technological Capability

The major policies that can impact on technological capability of firms include: firm level policies; policies of service firms/suppliers; industry-level or sectoral policies; and infrastructure policies of government. The firm level policies are the policies set by the firm itself to guide her operations and activities. Some firm-level policies can encourage or discourage technological accumulation. Oji (1989) stated that a firm that discourages the operation of shift-work may have lower levels of capacity utilization and, hence, technological accumulation relative to others. Similarly, a firm with a policy of out-sourcing of repairs and maintenance of equipments and facilities may risk the slow growth of her innovation and investment capabilities relative to others that utilize their staff (and facilities) to provide these services.

The policies of service firms and suppliers refer to those of firms that provide inputs, credits, spares, maintenance, repairs, and other services to the firm. This is where the policies of Microfinance institutions are

important. The policies of such service firms and suppliers in their dealings with the enterprise may constrain or promote the growth of technological capability. With respect to credit, Massaquoi (2004a) stated that there are two types of credit policies relating to the informal sector, namely those that favor working capital and those that favor fixed capital loans. This categorization is valid with respect to both the quantum of funds available and the rate of interest. The study observed that a credit system (for example, a microfinance loan to clients) that does not favor fixed capital has the following positive effects on technological capability of borrowers: the encouragement of more careful investment in machinery; forces the operator to take greater care of available machinery through skilful use and carefully planned maintenance programs; makes the operator to be more innovative and more willing to undertake technological adaptations. The result of these will be an increase in firm's proficiency in investment, and her innovation and production capabilities. However, the major disadvantage of credit policy that does not favor fixed capital is that it may not facilitate the introduction of new hardware, and could constrain expansion activities, thereby limiting investment capabilities(Massaquoi, 2004a).

Industry-level or sectoral policies represent industry-wide or government policies for the particular industry or sector. They include regulatory policies, support institutions and infrastructure, industrial standards and professional requirements (Oji, 2005). Bell and Pavitt (1993) stated that a major government contribution to technological accumulation is its investment in education and training. Massaquoi (2004a) stated that government policy on support institutions and infrastructure for the informal sector is usually to provide (or establish institutions that provide) formal training in managerial and financial skills. However, such training is not likely to contribute to the production and innovative abilities of informal sector operators who are often the targets. To have any meaningful impact of technological capability, training must be directed at technical skills acquisition by the operators. Formal training in crafts and skills can be delivered through vocational educational centers or programs. Unfortunately, these centers are often equipped with expensive imported machinery, which the trainees may not be able to afford after training. It is

more likely that on-the-job training through apprenticeship systems and internships may exert more beneficial effects of technological capability development (King, 1984).

The policy on provision of adequate infrastructure for the informal sector relates to the clustering of all like-operators in a specific zone or industrial area (Massaquoi, 2004a). Although initially this policy may lead to the separation of informal sector operators from their markets, it is however likely to have beneficial effects on the accumulation of technological capability among the clustering firms in the long run. This is because competition among the firm clusters in a particular zone would stimulate innovation and product improvements. Even where the firms become unionized, clustering promotes organized competition and competitive co-operation which engender institutional innovation and linkage capabilities. Also, there would be rapid transfer of skills and knowledge among the clustering firms, which promotes production efficiency. Furthermore, such clustering may lead to process specialization and interdependence among firms in the industry in the production of particular products (Mytelka and Tesfachew, 1999). This leads to the development of linkage capabilities.

III Methodology

III.1 Sampling Procedure

The sampling for this study was done along the major geographical regions of Nigeria namely the North, the South-West, and South-East regions. A list of the registered MFIs was obtained from the UNDP MicroStat Nigeria Program, along with some other information from reconnaissance surveys. The list of MFIs compiled was stratified according to their region of operation. Initially, three MFIs were randomly selected from each region to make a total of nine MFIs for the study. The eligibility criterion for the selection of MFIs is that at least 10% of the clients are engaged in technology-using enterprises. One of the MFIs initially selected from the Northern region was later dropped because during the survey almost 99% of its clients were engaged in trading activities, which uses little or no

technology. It was substituted with another MFI from the Eastern region of the country. Thus the distribution of selected MFIs is as follows: North (2), East (4), West (3), making a total of 9 MFIs.

For each selected MFI a list of the technology-using micro-borrowers with at least 6 months relationship with the MFI was obtained from them. Thirty micro-firms were randomly selected from each MFI to make a total of 60 respondents from the North, 90 respondents from the West, 120 respondents from the East, or 270 respondents for the entire study. The selected respondents were interviewed during field surveys by well-trained research enumerators, most of whom were seasoned university academics. In addition, the selected MFIs were interviewed using a separate set of questionnaire and Focus Group Discussions (FGDs). However, only 250 of the clients' questionnaires were adjudged to be usable for the analysis.

III.2 Data Collection Methods and Instruments

The method of data collection and the instruments/variables adopted for this study followed the methodology developed by the UNESCO Expert group on the Transformation of the activities of clients of MFIs (Massaquoi, 2004b; Oji, 2005). The methodological frameworks later elaborated by UNESCO (2004) are that several factors were identified as linkages between policy and technological capability. The linkage factors were separated into two: those aspects of policy that influence technology acquisition and transfer (i.e. the determinants); and those that show the level of technological capability (i.e. the indicators). These factors and their origin (i.e. government policy, MFI policy, etc) were elaborated in a framework (see: Oji, 2005). Under the framework, the indicators of technological capability were grouped to show how they can be used to determine the levels of technological capability and the components of the existing capability (i.e. hardware, software and ergo ware).

This methodological framework guided the development of the data collection process, instruments and plan for the study. In consequence, the research considered any of the following factors as indicators of technological capability: changes in production level, productivity,

profitability, competitiveness, age of machines, automation, skill level, new products, product quality, evidence of reverse engineering, design capability, equipment learning, etc.

III.3 Data Analysis

Two technological capability regression models were run. First, to assess the determinants of technological capability of borrowers, an ordinary least squares regression was estimated with the dependent variable as technological capability of clients (TCap) which was constructed as a composite index consisting of the following technological indicator variables: firm's assessment of the extent of its growth in output, improvement in quality of product, adoption of new technology, adaptation of equipment, new product development, firm's competitiveness, and improvement in workers skills.

This composite indicator of technological capability (or technological capability index) was regressed against the following independent variables: age of firm owner (X_1), number of workers/employees (X_2), length of experience in the business (X_3), loan amount (X_4), loan duration (X_5), loan interest rate (X_6), education of respondent (years of schooling) (X_7), regular scale of production per annum (N) (X_8), age of machinery (X_9), appropriateness of equipment/machinery to production needs (X_{10}), appropriateness of equipment/ machinery to workers' skill level, and available infrastructure (X_{11}), and current value of firm's investment in machinery/equipment (X_{12}).

$$\text{TCap} = f(X_1, X_2, \dots, X_{12}) \dots\dots\dots 1$$

Where: **TCap** = Technological Capability index (a **Composite variable**)

- X = Age of firm owner (years)
- X^1 = Number of workers/ employees
- X^2 = Length of experience in the business (years)
- X^3 = loan amount (N)
- X^4 = loan duration (months)
- X^5 = Loan Interest rate (%)
- X^6 = Education of respondent (years of schooling)
- X^7

X	=	Regular scale of production per annum (N)
X^8	=	Age of machinery
X^9 X_{10}	=	Appropriateness of equipment/machinery to production needs (index)
X_{11}	=	Appropriateness of equipment/machinery to Workers' Skill level, and Available infrastructure (index).
X_{12}	=	Current value of firm's investment in machinery/equipment (N).

IV. Results and Discussion

IV.1 Characteristics of the Microfinance Institutions (MFIs)

This section presents the characteristics of the MFIs that participated in the survey. The states in which the offices of these MFIs were located constituted their primary area of operation. However, most of the MFIs had branches in other states. The branch spread was between 3 and 28 states, with a mean of 5 states. Establishing branches in several states enabled the MFIs to expand their clientele base in response to the rising demand for their services. In terms of experience, majority of the MFIs had been in the business for 10 to 20 years. The oldest MFI, was established 23 years ago, while the youngest, was only 7 years old in the business. The length of business experience is important in micro-financing. Older and more experienced MFIs are expected to have larger client base, have accumulated more savings and made more loans, and have wider range of services and products, in addition to more targeted and client-focused delivery mechanisms. Also, older MFIs would more easily appreciate their clients' needs for technology, networking, information and services to improve clients' operations.

The MFIs had a total of 341,447 clients, whose total savings with the MFIs in the last five years amounted to about x625 million (Table 1). Also, during the same period the loans made by the MFIs to their clients amounted to a cumulative value of about x1.69 billion. In terms of clients distribution in the last five years, about 76 % of the clients were engaged in trading,

16% were into production and processing activities, while the remaining 8% were engaged in other sundry activities especially services and repairs.

The predominance of trading activities among MFI clients reflected their preference for quick-yielding and short-term activities to enable early loan repayment, and minimize default. This is an important feature of non-collateral borrowing which these MFIs practice. It is also an important device to monitor the loan as early as possible and to avoid diversion. However, the use of technologies and the problems with it is not easily manifested in simple trading activities. Very little or no technologies are required for simple trading enterprises. Therefore, our concern is largely with the MFI clients that are engaged in production, processing, services and other activities that involve the use of technologies. Although trading enterprises may not display hardware capabilities, they are like other enterprises, involved in the utilization of software and ergo ware capacities resulting in the development of strategic marketing and linkage capabilities (Ernst et al, 1998) .It is also possible that the greater risks involved in production and processing enterprises and the associated need for a waiting period before production matures (or moratorium) may have contributed to the adverse selection of these clients by the MFIs.

In the last five years, there has been a significant growth in the clientele, savings and loans made by these MFIs. Table 2 shows that between 2001 and 2004, the number of clients increased from 36,417 to 341,477. This reflected increasing demand for microfinance services. During the same period, the volume of savings accumulated by the MFIs from their clients rose from about x63.917 million to x295.847 million. Also the volume of loans made to clients by the MFIs increased from x182.109 million in 2001 to x652.804 million in 2004. Increased funding and donor support are required to meet this rising demand for microfinance services. This observation is in agreement with the complaints by most of the MFIs that one of their key problems is the need for more funding sources to meet the rising demand by their clients. However, any donor support should be properly structured preferably along the lines of a revolving loan fund, in order not to compromise the financial and operational sustainability of the MFI, when the funding dries up.

Three categories of loans were given by the MFIs, namely short-term, medium-, and long-term loans. The short-term loans were given for a period of 3 months, the medium-term loans lasted for a maximum period of 6 months, while the long-term loans lasted for one year (Table 3). In practice, the actual duration of these loans depended on the enterprise and the purpose for the loan. Most medium-term loans were for 4-6 months, while long-term loans lasted for 8-12 months. The interest rates on most MFI loans were between 30%- 36% per annum, while the maximum loan size was about N 15,000, and the minimum was between x5,000 to x7,000. The MFIs had an average repayment rate of about 95%.

IV.2 Characteristics of the Micro-Borrowers

The enterprises surveyed were mostly in the informal sector. They were engaged in a broad range of activities including production of goods, repairs, sewing and rendering of sundry services. Table 4 shows that a greater proportion of the respondents, about 36% were engaged in food processing/trading followed by farming, 23%. About 11% of the respondents were engaged in service activities such as mechanics/repairs, garments/textiles sewing and carpentry. The predominance of food processing/trading and farming enterprises in the sample was expected because microfinance is largely directed at the poor; and most of the poor are primarily engaged in agriculture-related activities. Agriculture and related activities including processing of food products and petty trading provide reliable medium for subsistence and economic participation by the poor. Moreover, the resource requirements including initial capital and technology for embarking on these enterprises are very low. Similarly, the repair activities have limited initial resource and set up requirements. Given the low resource requirements for these enterprises, it was expected that the ownership and management requirements would be simple. About 85% of the micro-firms were sole-proprietorships or family businesses; while 8% were partnership businesses (Table 4). Sole-proprietorship or family businesses offer the distinct advantage of flexibility in managing the enterprise which these micro-businesses really need. It also offers the advantage of integrating family and business decisions to promote effective management of household resources and objectives.

The average age of the owners of these micro-firms was 42 years, and most of them had undergone pre-business apprenticeship for a period of about 1.4 years. These owners have been operating their enterprises and accumulating the necessary experiences for a period of about 10 years. Figure 1 shows that a majority of the operators, about 83% were females, while the remaining 17% were males. This finding is consistent with other studies such as Alter *et al* (2002) and World Bank (2002) who observed that most microfinance borrowers are women. Simply on account of this, Ihenduru (2003) stated that microfinance is increasingly becoming a strategy for women empowerment.

IV.3 Effect of Policies on Technological Capability of Micro-Borrowers

It is important to identify what policies influence the growth or accumulation of technological capability of micro-firms. The regression results to assess the determinants of the technological capability of micro-borrowers are presented in Table 5. The estimated F-ratio of 14.07, which was significant at the 1 percent level and a low standard error of estimate, indicated that the model provided a good fit to the data. Also, the adjusted R-square indicated that 54% of the variability in the dependent variable was explained by the included regressors.

The regression results show that the technological capability of the micro-borrowers was positively and significantly explained by the number of employees/workers, duration of client's loan, age of major machinery/equipment of the enterprise, and the degrees of appropriateness of the machinery/equipment to workers' skills, and available infrastructure. Other things being equal, an increase in the number of workers/employees would lead to the accumulation of greater technological learning if the work environment promotes a culture of team approach to task execution. Increased technological learning, improves the long-term efficiency and profitability of the enterprise. Most production machinery are operated by more than one employee, and often in turns or by shift-work arrangements. It is, therefore, likely that the micro-borrowers employed team approach to executing the tasks of their enterprises.

Also, an increase in the duration of client's loan increases the technological capability of borrowers. This is also expected as loans increase the capital base (and assets) of the borrower particularly if they are used to finance capital spending. Thus, the longer the loan is productively used the greater the production capability of the enterprise. Short-duration loans have the tendency to disrupt the operations (and capital structure) of firms because of the frequent need for repayments.

Similarly, the age of the major machinery of borrowers was positively and significantly related to the accumulation of technological capability. This is expected as worker's/operator's skill improves with greater familiarity and mastery of production equipments/machinery which increases with the age of the machinery. However, this is true as long as technological obsolescence and depreciation has not rendered the equipment inefficient or dysfunctional.

Also, the extent of appropriateness of machinery/equipment to workers' skills and available infrastructure are expected to be positively related to technological capability of firms. Appropriateness of equipment to workers' skills and available infrastructure promote efficiency in the use of technology, which invariably leads to worker dexterity and technological learning over time. Similarly, the appropriateness of equipment to available infrastructure such as electricity and water supplies, roads and transportation systems and traditional systems of rules and institutions would lead to development of technological capabilities that are appropriate to the context and local business environment. This is important because sustainable technological capability must be appropriate to the business environment of the micro-operators.

However, the technological capability of firms was negatively but significantly related to the length of experience of the operator and interest rate on the loan received from the MFI. It is expected that operator's technological accumulation would increase with experience, but this negative relationship is an empirical matter. It is possible that the length of business experience was indexing a latent variable, perhaps the age of the enterprise owner. The age of the owner of the enterprise was itself

not significant. Adoption studies have shown that younger farmers are more likely to adopt improved technologies than older farmers (Oji and Onoja, 2002). As expected the interest rate on the loan received from MFIs was negatively and significantly related to technological capability of borrowers. High interest rates may not encourage the acquisition of fixed assets, including machinery, equipments, and tools, which promotes technological accumulation of borrowers as lenders want to recoup their investments faster; while lower rates are likely to encourage the acquisition of equipments and tools. The key message here is that MFIs should reduce their lending rates or spread the interest payments in such a way as to promote greater use of the loan by the clients. It is possible that interest rates may be proxying for non-interest charges also. MFI should also reduce their non-interest charges or get this paid from the interest accruing from clients' savings. In order to encourage technological acquisition, MFI can categorize their loans into low and high interest loans. The conventional lending to clients can be maintained as "high interest" loans for working capital, while loans for capital assets or technology acquisition should be developed as "low interest" loan products. Such loans can be secured by a mortgage over the fixed asset so acquired by the micro-borrower. The low interest loans for capital assets/equipment acquisition can be funded as on-lending schemes based on donor support under revolving loan fund model or loans from development finance institutions at concessionary interest rates.

V. Conclusion

Microfinance is a development tool. A good microfinance policy should aim at enabling the poor to increasingly move out of poverty through cycles of loans and repayments. Such policies should focus on growing the technological capabilities of MFIs clients. The MFI policies and good practices identified and recommended by this study include: First, the MFIs should increase the duration of clients' loans, (or spread the repayment over a longer period, and increase the moratorium). Second, reduction in MFIs' lending rates, and introduction of fixed assets loan products. Third, the MFIs should assist clients to prepare their business plans as well as provide them with training on credit utilization. Finally,

the MFI can categorize their loans into low and high interest loans; with conventional lending to clients maintained as "high interest" loans for working capital, while loans for capital assets or technology acquisition should be developed as low interest loan products and financed through donor-supported revolving loan fund model.

A good policy environment is required to support the technological upgrading of micro-borrowers.

Appendix

Table 1: Some Characteristics of Surveyed Microfinance Institutions, Nigeria, 2005

MFI Name	Clients 2004	Total Loans		Clients Distribution		
		Total Savings, 2001-05 (x)	Value, 2001-05 (x)	Trading%	Production%	Others%
DEC-Enugu	3750	40,000,000	163,000,000	94	6	0
NALT-NUSHO	7207	45,631,943	126,473,721	60	40	0
COWAN	260,000	118,000,000	121,840,000	70	20	10
DEC-Bauchi	18,160	77,572,031	361,363,846	95	0	
LAPO	32,942	234,623,414	601,461,653	39	34	27
PDC	2,950	11,810,769	55,323,000	62	15	23
ADDS	1,600	7,350,000	100,700,000	95	5	0
JDPC	14,658	89,023,218	156,199,000	90	0	10
ASHO	180	1,234,000	4,843,000	80	20	0
TOTAL	341447	625,245,375	1,691,204,220	76	16	8

Source: Field survey, 2005/06.

Table 2: Growth in The Clients, Savings, and Loans Of Survey Microfinance Institutions

Year	Nos of Clients	%Change	Savings Volume (x)	Saving Growth (x)	Loans value (x)	Loans Growth (x)
2001	36417	-	63,917,574		182,109,665	
2002	51800	0.422	68,388,501	4,470,927	298,352,041	116,242,376
2003	64307	0.241	125,654,236	57,265,735	384,514,111	86,162,070
2004	341477	4.310	295,847,332	170,193,096	653,804,712	269,290,601
MAR.2005	275970	-0.192	71,437,732	-224,409,600	172,423,691	-481,381,021
TOTAL			625,245,375		1,691,204,220	

Source: Field survey, 2005/06

Table 3: Term Structure of Loans By Surveyed MFIs, Nigeria, 2005

Loan Type	Payback Period (Months)	Interest Rate, (%p.a, months)	Repayment Rate%	Size (N'000)
Short-term (<3)	3	30-36	95-100	5-7
Medium (3-6)	4 - 6	30-36	95-100	8-10
Long (>6)	8 - 12	30-36	87-99.4	8-15
AVERAGE			95%	8,000

Source: Field survey, 2005/06

Table 4: Characteristics of Enterprises Surveyed

Type of Enterprise	Frequency	Percent	Cumulative Percent
Carpentry/Wood	7	2.8	2.8
Garment/Textile	18	7.2	10.0
Mechanic/repairs	6	2.4	12.4
Food processing/Trading	91	36.4	48.8
Farming	58	23.2	72.0
Soap/Detergent	23	9.2	81.2
Others	47	18.8	100.0
Total	250	100.0	
Ownership			
Sole/Family Business	212	84.8	85.6
Partnership	20	8.0	93.6
Private Company	11	4.4	98.0
Others	7	2.8	100.0
Total	250	100.0	

Source: Field survey, 2005/06

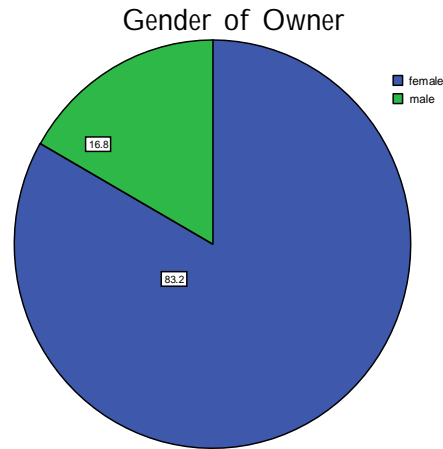


Fig.1: Gender of Owners of Enterprises Surveyed

Table: 5 Regression Estimates (Based on OLS) of the Determinants of the Technological Capability of Micro-Borrowers in Nigeria

Explanatory Variables	Coefficients	Std. Error	t-value	Sig.
Age of Owner	-.005	.005	-1.045	.298
Number of Employees/ Workers	.017	.008	2.040	.043
Length Experience in Business in Years	-.015	.006	-2.471	.015
Loan Amount (N)	-2.839E-07	.000	-.825	
Loan Duration in months	.121	.033	3.645	.000
Loan Interest Rate (%)	-.023	.007	-3.375	.001
Years of Schooling	.007	.006	1.168	.245
Scale of production per Annum (N)	-1.441E-08	.000	-1.101	.273
Age of machinery (years)	.038	.012	3.266	.001
Appropriateness of Equipment/ Mach to production needs	-.019	.052	-.355	.723
Appropriateness of Equipment/ Mach Workers Skill level	.377	.054	6.981	.000
Appropriateness of Equipment/ Mach to Available Infrastructure	.126	.040	3.161	.002
Current value of firm's investment in Machinery/ Equip(N)	6.479E-08	.000	1.327	.187
(Constant)	1.069	.359	2.975	.003

Statistics: F-ratio=14.070; R-square=0.59; R-Square (adj)=0.54; S.E= 0.5812; Source: Based on Field data, 2005/06

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