International Journal of Scientific Engineering and Applied Science (IJSEAS) – Volume-8, Issue-5, May 2022
ISSN: 2395-3470
www.ijseas.com

# Does Measuring Human Capital Productivity Matter In Microfinance Industry?

Adolphe KANKISINGI SADIKI (Université Libre des Pays des Grands Lacs)

Rogers KASEREKA VURAHIRE (Institut Supérieur de Commerce-Goma)

Séraphin MIZERERO (Institut Supérieur des Techniques Médicales-Goma)

Patrick MALISAVA (Institut Supérieur des Techniques Médicales-Goma)

Rodrigue BORA MASIRIKA (Université Libre des Pays des Grands Lacs)

## Summary

In this paper, we propose to estimate a Cobb-Douglas production function to analyse whether the productivity of microfinance institutions can be explained by the use of different categories of staff in the province of North Kivu. The aim is to test the contribution of each professional category in the microfinance sector on the performance of these institutions and to develop an empirical model to quantify the links between production factors and final output. From our investigations, it was clearly demonstrated that there is a positive relationship between the occupational categories and the productivity of microfinance institutions. Thus, the category of managerial staff has a positive, significant and high impact on the variation of value added of MFIs, with a coefficient (0.13), proving its major impact on the activity in the sector. In addition, management agents have a higher, significant contribution to the productivity of MFIs, justified by their level of education.

The extension of the analyses, through the OLS estimators, also shows that capital or capital intensity positively and significantly affects the productivity of these MFIs with an associated coefficient of 0.97. Using the Translog estimates to estimate the elasticity of production in relation to the different categories of labour, the results show that the elasticity of managers is all the stronger as the weight of managers is itself high and, on the other hand, that the elasticity of supervisors is inversely related to the share of managers.

## Introduction: background and relevance

The concept of human capital was shaped by the work of seminal economists such as Shultz (1961) and Becker (1975). The starting point of this neoclassical stream of research was the

question of the return on an investment in education for a given individual. Human capital is thus perceived as an endogenous factor of growth and development in the same way as transport and communication infrastructures. It is a determinant of the productivity of an economy (Romer, 1989; Foray, 2000; Andrew, 2005). This

presupposes a link between human capital and the level of productivity (Guillard & Roussel, 2010),

As a result, the notion of productivity, the lifeblood of this paper, remains an essential and complex element in the current economic system. Its implication in the economy as well as its effects on the population are perceived in different ways according to social structures (Fourastié, 1952). Thus, this notion being broader as it gathers several aspects for its understanding, it allows to measure the efficiency of a company in terms of use of its resources to produce goods and services (JDN, 2019).

From these different analyses above, we deduce that there are different factors (Inputs) that intervene in productivity, notably material, immaterial and human capital. In our context, we analyse this aspect based on the productivity of human capital by focusing on microfinance institutions. However, several studies devoted to the question of measuring human capital are relatively rare, and the vast majority of them are either macroeconomic analyses, the most dedicated to the agricultural and manufacturing sectors (Hopcraft, 1974; Bouoiyour, & Toufik, 2007; De La Fuente, 2011).

Overall, these different studies have led to rather disappointing results, since for the most part they indicate an impact of human capital that is either not significant or does not show the expected sign.

The criticisms of these studies and many other reasons certainly invite a broadening and deepening of the analysis applied to African countries, in order either to better understand the relationship between human capital and firm growth, or to better explain why, within these countries, this relationship seems to be so fragile (Gurgand, 1993).

In view of these details, human capital goes hand in hand with the level of qualification because it is a production factor for the company and must be composed of the aptitudes, talents and experience accumulated by a person and which determine his or her capacity to work or produce,

because the aim of any company is to achieve the objectives set (to the optimum), and it is up to the company to manage all the resources at its disposal, including human capital. A very modern trend tends to place people at the centre of the debate on economic success, making them not an accidental factor, but the pillar of productivity and progress (Mbaye, 2002).

From the particular point of view of the microfinance sector as our field of study in this work, there is an intensive competition in the sector that forces these institutions to adopt appropriate strategies to increase their performance levels in order to guarantee their survival and development as Gates (2010) tells us. This explains why human resource-based organisational practices and techniques have become a privileged field of study for the microfinance sector.

From this perspective, it is clear that training, upgrading, or developing staff skills is a major challenge for many MFIs. This is particularly the case in countries where the workforce is characterised by low levels of education and limited work experience in the financial sector (Adair, 2010).

Thus, skilled labour can explain the difference in performance between firms, as it is expected that human capital with a solid basic education can contribute positively to the performance of the firm, and if not, that it can contribute to underperformance, which must be verified at our level (Logossah, 1994).

As empirical work on this issue readily shows, most of it has been carried out through production functions involving the structure of qualifications, in order to take into account the differentiated influence of different categories of the workforce (Mairesse, 1985 and Sevestre, 1990).

For their part, the estimates conducted by Mairesse and Sassenou indicate a positive and significant impact of the qualification of all the qualitative factors considered on the performance of the firm, their results being subsequently amply confirmed by the study of Sevestre (1990). The latter showed that the most productive companies, compared to the least productive companies, employed on average 6 times more technicians, 2 times more administrative and commercial managers, and 2.5 times less unskilled personnel (and more generally, the

concordance would be systematic between labour productivity and the composition of the labour force).

The study by Huiban (1994), although inspired by the approaches of Mairesse and Sassenou and Sevestre, differs largely in that it integrates the sectoral dimension into the analysis (it therefore takes into account the fact that companies belong to different production and employment logics).

Also, according to Latreille and Varoudakis (2006), on the one hand, the use of a skilled labour force would improve the level of overall factor productivity, and on the other hand, the low level of human capital would explain (among other reasons, including the insufficiency of infrastructure and the high level of trade protection) the drop in overall factor productivity within the various industrial branches.

As for Mbaye, he concluded that there is a strong and significant link between education and productivity, since, in his various estimates, the coefficient of the human capital variable is always significant, with the expected positive sign (it would even be the only one of the variables, along with capital intensity, to be robust to all specifications).

While most of the studies cited above indicate that labour productivity is strongly influenced by the skill levels of the workforce, it should be noted that these studies did not consider the microfinance sector in this regard.

Thus, the question of the present study is to verify the existence of an impact of the professional categories of the workforce on the efficiency of the MFIs in South Kivu.

To this end, the present work postulates that there would be a positive and significant impact of these professional categories on the efficiency of MFIs in South Kivu.

Studies on staffing issues in Micro Finance Institutions (MFIs) in general and on professional qualification in particular are rare. And yet, the professional qualification of MFI staff should be seen as one of the key variables of its performance at a time when it has entered a critical phase

of its development characterised by strong competition in the sector, the desertion of clients and the stagnation of its growth rate.

The objective of this work is therefore to determine empirically the link between the productivity of a Microfinance Institution based on the quality of its staff, limited to the province of North Kivu, for a period of 3 years, precisely from 2019 to 2021.

It is with this in mind that we propose to develop an analysis based on the production function, which makes it possible to quantify the links between production factors and final production. With regard to the latter, its advantages are multiple (Dormont, 1989).

The basis of the neoclassical theory of human capital is therefore that education is an investment that increases the productivity of those who receive it and thereby creates a rise in their wages (Mincer, 1958). The same author goes on to say that entrepreneurs tend to pay higher wages to better educated workers because they observe that their ability and productivity are higher than those of less educated workers.

The rest of the paper is organized as follows: first, the theoretical and empirical literature review is developed, followed in the second section by the development of the methodological framework. The presentation of the results constitutes the substance of the third section. Successively, the discussion of the results and the conclusion constitute the fourth and fifth sections.

## Literature review

We first provide a review of the definitions found in the literature in relation to classification, workforce skills and performance, and then trace the theoretical explanation of human capital. In addition, we offer the rationale for performance based on workforce skills (human capital).

Classification and professional qualification

Labour or vocational qualification is the ability of a person to perform a particular trade or job (OECD, 1998). It is supposed to depend on training and qualifications, experience as well as personal and moral qualities. Johan (1875) defines vocational qualification as the ability of a

worker or the conferring of a quality, title, name or recognition of a level of professional competence.

According to Schultz (1961), the qualification of the workforce refers to the characteristics of the worker that determine his or her level of productivity: health, adult continuing education, education, migration and on-the-job training (or motor skills, work methods, intellectual knowledge).

Gary Becker's (1962) conception of the Qualification of the workforce is very close to the concept of human capital, which explains the Resources of an individual that influence future real income. Observed either through education or on-the-job training, human capital investment is classified by its general or specific character.

The notion of a vocational qualification implies the mastery of skills that are useful for the exercise of a profession. The vocational qualification that is the subject of the analysis is of particular interest because it generally concerns such an important element of the workforce, especially in a sector like microfinance. It is also interesting because the acquisition of the skills needed to work in the microfinance sector can be achieved through an apprenticeship or training programme (Labie, 2014; Mersland, 2015; Périlleux, 2015; Théry, 1991). The analysis of professional qualification is done mainly by the code of the classification of professions in force in each state (OECD, 2013).

This implies that the professional qualification establishes a social hierarchy of groups of individuals and thus a principle of hierarchy of ranks and wages in a given professional universe (Théry, 1991). Thus, the professional qualification is hierarchised by professional categories according to the regulations of each country (Schultz, 1961).

In the Democratic Republic of Congo (DRC), the professional category or classification is obtained from the variable Hierarchical classification of jobs established by Congolese law. This gives us information on the different professional levels within Congolese companies. The occupational category variable is part of the information collected on the individual characteristics of each worker in the private and public sector in the DRC.

The classification of the workforce under Congolese law (FEC, 2016) is based on socio-professional categories (CSP), and as such is essentially articulated around a technical division of jobs.

Four different categories are taken into account, namely: management staff, executive staff, supervisory staff and operational staff.

Productive efficiency or productivity

Productivity represents the productive efficiency of the factors of production, namely labour and capital. It can be measured in different ways: labor productivity is the ratio of output to the amount of labor required for production and capital productivity is the ratio of output to the amount of capital required for production.

Total factor productivity is the ratio of output to the amount of labor and capital required for production. If, in the calculation, output is represented by the number of units produced, productivity is said to be physical. If output is represented by its monetary value, i.e. by turnover or better by value added, productivity is said to be in value terms (Melchior, 2010).

The productivity of labor or human capital will therefore be; given that the latter is defined as the set of productive capacities that an individual acquires through the accumulation of general or specific knowledge and know-how (Becker, 1992); the productivity provided by labor (OECD, 2006).

From the above, from an economic point of view, authors interested in human capital have tried to explain the importance of education and training.

The term human capital is not an insignificant choice: in the same vein as financial or productive capital, the authors see it as a source of wealth and value. Like any other type of capital, human capital can enhance or sustain productivity, innovation or employability. On the other hand, it can grow, shrink or become useless. While the notion of human capital is widely understood, it is more difficult to find a definition that is unanimously recognized and accepted by researchers. Here are some of the definitions proposed by various authors. Based on the definitions of several

authors (Johan von Thünen, 1875; Schultz; 1961; Mincer; 1962; Becker, 1962; OECD; 1998; Rodriguez, P. J. & Loomis, R.S., 2007), several observations can be made: first of all, like social capital and unlike physical or financial capital, human capital is indissociable from the person who has acquired it. An individual and unique characteristic, it is specific to each individual insofar as it is the reflection of a personal history and a singular path.

From 1965 onwards, Gary Becker developed the concept further and popularized it, winning the Nobel Prize in Economics in 1992 for his development of the theory of human capital. Management researchers such as Flamholtz and Lacey, from 1980, or later Lepak and Snell, contributed to the dissemination of the theory and its practical use. Thus, the theory of human capital has indeed contributed to explain economic growth and the formation of individual remuneration. It assumes, as we shall see, that individuals can improve their productivity through voluntary acts of investment in education or training. Differences in labor income then reflect the fact that individuals do not (for various reasons to which we shall return) make the same investments, in training for example (Stéphanie, 2009).

Human capital could be understood as the strategic activation of human potential (Cappelletti, 2010). These two central concepts, skills and their management, are present in the terminologies used in management to designate or approach human capital.

For example, Savall and Zardet (2008) define intangible investment as a set of individualized or collective mini-actions that converge towards the achievement of the company's strategic objectives. For Lacroix and Zambon (2002), intellectual capital represents a set of endogenous resources (skills, know-how, etc.) and externalisable resources (brands, reputation, consumer satisfaction, etc.) that enable the creation of value for all stakeholders through the search for competitive advantages.

Thus linked to skills and their management, and hence to performance, the concept of human capital is to be brought closer to the theory of resources and the configurational approach linked to it. This theory has been stimulated in particular by the internal resource theory popularized by Hamel and Prahalad (1993). According to this theory, employees and the way they are managed play a crucial role in the success of organizations and are a crucial source of sustainable strategic

advantage. To demonstrate its contribution to human capital, the resource theory has relied on the configurational approach developed by Peffer (1995) and Delery and Doty (1996), whose purpose is precisely to measure the effects of human resource practices on economic performance.

Adam Smith showed him that workers with a higher education have know-how and a significant cultural and intellectual background. They are therefore more productive, which improves their efficiency. This better efficiency and effectiveness consequently allows them to be more innovative (Jérôme G, 2000).

Given this analysis, two streams of research have recently revived interest in these issues: on the one hand, according to the new theories of economic growth with which the names of Romer, Barro and Lucas are associated, human capital is a determining factor of economic growth.

On the other hand, there is now a growing interdisciplinary consensus that the early years of childhood play a critical role in the development of productive and well-adjusted adults. Family, but also welfare and health policies appear to have a key influence on the acquisition of human capital.

There follows a desire to optimise this potential which necessarily disrupts the traditional processes leading from the individual to the employer (Jarousse, 1991). It is then that Michel Fourmy (2012) demonstrates that the theory of human capital functions by analogy with that of financial or physical capital. He considers that human capital is made up of three elements which together determine a certain aptitude of the individual to work: skills, experiences and knowledge.

Relationship between labor force skills and overall productivity

As analyzed by Yves (2014), the volume of production that provides the most profit for a firm imposes a rationality on it, this is what gives the basis for the rationality hypothesis (Varian, 2011), it must therefore produce and find outlets for its production. With this hypothesis, the company generally uses both factors of production, namely capital and labor.

Dia A. (2005) points out that entrepreneurs usually establish relationships with people who are active both outside and inside the firms. And Becker (1964) thus these entrepreneurs, consider

the education of individuals as a key point proving productive capabilities, as long as the human capital theory is mainly about the nature of personal changes that would result from the education of individuals.

Moreover, given the difficulty of pinpointing the contribution of human capital alone to productivity growth, investment in education and skills remain central aspects of innovation and, at the very least, facilitating the introduction of new production-enhancing technologies as presented in the OECD (2015) report as well as new forms of work organization.

Through this lens, the OECD has found that a more educated workforce raises the rate of real economic growth, but on the other hand, some authors, such as Pritchett (2001), consider the reasons why educational investment may not contribute to the productivity growth of an entity or organization. Indeed, De la Fuente (2011) concludes that the contribution of human capital investment to productivity growth is positive and quite significant.

He assumes that the knowledge and skills embedded in the individual have a direct effect on productivity and thus increase the ability to move towards technological advancement (Dia, 2005). Building on the approach taken by Yves (2014), he shows that beyond the aggregate level, productivity assessment can be carried out not only at the branch level for industrial firms, thus allowing for inter-branch measures of technical progress, but also at the level of analyzing the impacts of the qualification levels of the workforce on their productive performance, and this same approach can be adapted in the case of MFIs (Buxton, 1977 and Dia, 2005).

Finally, following Dia's conclusion (2005), he shows us that in the case of his country, Senegal, human capital does not really have an impact on the productivity of enterprises, simply because the low level of technical progress in these enterprises calls into question the entire production system of the firm in question. On the basis of the previous analysis, this same situation can be observed in the operating system of MFIs in our environment (DR Congo).

In the light of the above, we are in the process of identifying studies that have already been conducted on the relationship between qualification and occupational classification. Gibson, Susan (2000) points out in passing that young people under 26 and jobseekers over 26, especially those with low qualifications, have difficulties in finding employment and if they are employed, they contribute little to firm performance.

Thus, still starting from the studies conducted by Mairesse and Sassenou (1989; Dia, 2005) on the impact of qualitative factors on efficiency or marginal productivity, the results through the production functions of the Cobb-Douglas specification challenge the structure of job qualification. Thus, there is a positive and significant impact of all the qualitative factors considered on the productive efficiency, but especially the engineering and tertiary staff are the variable whose impact is the most important. Hence, the growth of the share of highly qualified labor not only had a positive and significant impact on productivity, but this impact also increased over time, beyond a certain threshold.

More specifically, the marginal productivity of managers and technicians appears to be much higher than that of unskilled workers. Thus, the gain that a firm can expect from a strengthening of its administrative and commercial staff is much more pronounced if it implements a capital-intensive technology employing an already highly skilled workforce. The use of skilled labor would improve the level of total factor productivity, but also the low level of human capital would explain the decline in total factor productivity within the different industrial branches.

To test the link between workers' education and productivity, Mbaye (2002) starts from a sample of 700 Senegalese firms estimated by means of an OLS model of the Cobb Douglas function specification. He found positive and significant results as previously predicted. These studies were proxies for human capital stocks, and due to the lack of necessary data on the education levels of the workforce, they use the SMIG as an indicator to measure the differences between firms.

Finally, Dia (2005) conducted a study on the effects of human capital on firm productivity in Dakar, Senegal. The methodological specification used by Dia is the Cobb-Douglas or Translog, the ordinary least squares (OLS), the between and within estimator, and finally the random effects estimator. Overall, the results obtained here do not indicate a considerable impact of the skill structure (and more particularly of the most qualified categories of labor) on productive performance.

In their research on the impact of professional qualification on performance, Buxton (1977), Black and Lynch (1996), Mairesse and Sassenou (1989), Sevestre (1990), Latreille and Varoudakis (1997), Mbaye (2002) and Dia (2005), noted that the use of a qualified workforce improved the level of overall productivity. They also show that the low level of human capital would explain the decline in aggregate productivity.

Thus, with regard to the specific characteristics of the MFIs vis-à-vis the companies in the different sectors in which this research has been conducted, we postulate the following:

H1. There is a significant positive impact of professional qualification on the efficiency of MFIs in North Kivu.

The studies of Mairesse and Sassenou (1989), Sevestre (1990) and DIA Abdoul alpha (2005) on the influence of the qualification of the professional classes on production were also interested in quantifying the qualification-productivity relationship and thus measuring the efficiency of each professional level within the firm. As our study focuses on occupational categorization in the sense of Congolese law, it would be important to see which category provides more efficiency to the firm.

Therefore, we assume the following:

H2. Professional and managerial staff is the variable with the greatest impact.

Dormont (1989) and Sevestre (2002) have shown that the use of the Cobb-Douglas production function has several advantages, including the fact that it allows the elasticity of each input to be determined directly in relation to production, or that it allows returns to scale to be estimated directly. Therefore, we assume the following:

H3. At any estimator, the coefficients obtained for all occupational categories are always significant.

## Methodology

We estimate the model using MFI data from the Bureau de Service d'analyses Economiques, Statistiques et Surveillance des Intermédiaires Financiers (SAESSIF) of the Banque Centrale du Congo (BCC) from 2019 to 2021 and from the Institut National de la Statistique (INS) Division du Nord-Kivu. These data concern 10 MFIs whose evolution is monitored during the study period, chosen at random. They are representative of the entire microfinance industry sector in

North Kivu over the period considered. We have thus developed a structure for the 10 MFIs that are subject to the ISFD (Institution du Système Financier Décentralisé).

We chose to conduct this study among MFIs that are located in urban centres. This choice was motivated by the fact that there is a lot of competition in this centre, which would justify a particular focus on the performance of MFI agents. The MFIs were chosen according to their importance as measured by their respective market share (BCC, 2018). Thus, only MFIs with at least 1% of the market share were selected. In doing so, we wanted to avoid the sampling error of not including the most important MFIs in the sample, which would logically bias the results. Overall, the composition of its different institutions in terms of workforce is heterogeneous. Indeed, the different categories of workforce that usually reflect different levels of human potential held by workers in microfinance enterprises in North Kivu (FEC, 2016) are presented in the table below.

Table 1: Different categories in Congolese law

| Socio-professional categories | Definition (according to FEC nomenclature) | Corresponding theoretical levels of education and/or training |
|---|---|---|
| Management agents | "Persons employed in jobs normally requiring a level of education higher than or equivalent to that conferred by the award of an engineering degree, a master's degree or by the acquisition of equivalent practical skills, taking into account some professional experience. | Graduates, masters, engineers, postgraduates, doctors. |
| Management staff | Employees in jobs normally requiring a level of education higher than or equivalent to that which can be attained by two years' systematic and complete study beyond the brevet de technicien or the baccalauréat, or the acquisition of equivalent practical skills through prolonged professional experience. | University degree, other tertiary education at bac+3 level. |
| Supervisory Officers | Master's level jobs attained after practical experience or with a qualification equivalent to that conferred by the technician's certificate or the baccalaureate.<br>They have limited autonomy and responsibility. | Technician's certificate, baccalaureate, technical and/or vocational education graduates, general secondary education graduates. |

| | | |
|---|---|---|
| Enforcement Officers | Staff with few qualifications, or those whose only training is basic education or short-term pre-training for the job. Such staff have no autonomy. | Primary school graduates, employees with no qualifications or out of school. |

Source: adapted from FEC 2015 nomenclature

Thus, we note that out of a cumulative workforce of 118 workers over the period under review, the microfinance sector in North Kivu employs 19 managers (16.1%), 45 supervisors (38.1%), 28 supervisors (23.8%) and 26 operatives (22%).

Definitions of study variables

In this paper, productivity is measured using value added, which is certainly one of the indicators that best reflects the efficiency of the capital/labour combination in the production process, especially since it allows intermediate consumption to be disregarded. Moreover, as is customary with productivity estimates, value added has been calculated in volume terms (i.e. by the constant price method, and the price index has therefore been used as a deflator).

The estimate of physical capital K was made on the basis of the tangible fixed assets recorded in the balance sheets, revaluing them to take account of the increase in equipment prices. As measured, this capital K is therefore in principle equal to the sum of the volumes of investments $I\tau$ /t (in prices and francs of the reference year), coming from the different generations $\tau$ and still forming part of the equipment at date t.

As for the labour factor, it is measured through the number of employees. Admittedly, this is an indicator that has been much criticised, since it does not take into account, for example, the duration or intensity of work. Other methods have therefore been proposed, such as taking into account the volume of working hours or wages. But for various reasons, these latter indicators are not themselves free of criticism, and therefore the use of headcount is an acceptable approach.

As regards the structure of qualifications, this is taken into account through the share of the different categories of labour in total employment. Since professional and managerial staff (PM) are the reference category, the other labour categories we are interested in here are management staff (MS), supervisory staff (MS) and executive staff (ES).

The different variables selected allow the description of the data collected from the statistics issued by the DGI's Statistical and Fiscal Declarations Office and by the Central Bank of Congo via its Economic Analysis, Statistics and Financial Intermediaries Monitoring Department (SAESSIF).

Value added (VA) is defined as the difference between production and intermediate consumption of the enterprise (Ndjobo and Abessolo, 2014). Value added is the most widely used indicator of productivity. It consists of the simple relationship between the production of wealth (by the company, the sector, etc.) and the amount of work it required, so that activity can be measured by value added (Gadrey, 1996).

Value added is a measure explaining the productivity of a company and thus expresses the efficiency with which the transformation of inputs into output has been carried out (Vincent, 1968). This variable is thus the dependent variable of the study.

Capital or capital intensity, which refers to the ratio of tangible assets (gross value at the end of the year) to the average number of employees in the firm (Dia, 2005). Capital intensity is used as a distinguishing criterion, and this study thus takes up the traditional opposition between capital-intensive industries (which are usually the financial sector) and labour-intensive industries (Huiban, 1994). The estimation of physical capital K as discussed above.

The volume of work, which corresponds to the total number of employees in each company. It includes the number of managers, executives, supervisors and operatives (Dia, 2005). This work factor 'T' is therefore measured through the number of employees, always referring to the professional categorisation in Congolese law, as presented in the previous pages.

It should be noted that the significance of these variables did not change over the analysis period. The data collected is sufficiently representative to explain the growth of value added in the microfinance sector in North Kivu.

Model specification Analysis and data processing techniques

Many empirical studies on the analysis of productivity generally consider it as the difference between the observed output and the output predicted by a Cobb-Douglas type production function estimated using ordinary least squares (OLS). This assumption was initially motivated by the statistical analysis of growth rates (Abramovitz (1956) and Solow (1957). However,

estimators determined in this way may suffer from two main types of bias: simultaneity bias and selection bias.

This study proposes to develop an analysis based on the production function, which makes it possible to quantify the links between the factors of production and the final output. The general form of our production function is the following:

$$Y = A\,K^{â}L^{*â}$$

With K a measure of physical capital stock and L* a measure of efficient labour. Following Mairesse&Sassenou (1989) and Sevestre (1990), L* labour will then be expressed in units of the same efficiency, and we will thus have :

$$L = \sum_{j=1}^{p} á_j L_j$$

Where $L_j$represents the number of employees corresponding to a qualification level j and $á_j$the ratio of the marginal productivity of an employee of qualification j to that of the reference category, p ième .

According to this model, the output (measured here by value added) of a given sub-sector i in year t will depend on its capital stock (C), its workforce (L), and the weight of the different categories of labour (Lj/L, where j=1, 2, 3).

To process the data, we successively use econometric analysis and analysis of the elasticity of production with respect to the different categories of labour.

Referring to the model specified by Dia (2005) as a basis for our study, we will use a double specification, inspired by the approach developed in many works (Mairesse and Sassenou, 1989; Sevestre, 1990; Crepon, 1993): initially, the analysis will be carried out by means of a Cobb-Douglas production function, and subsequently, we will switch to a Translog formulation.

To test our first hypothesis, the estimation of a Cobb-Douglas production function will allow us to study the signs and the significance of the coefficients in order to see if there is a positive and significant impact of the professional categories on the efficiency of the MFIs.

Within the framework of the compound error model, various estimators can be used. For our part, we have retained the conventional estimators, namely the ordinary least squares (OLS) estimator and the multicollinearity test.

Firstly, the Cobb-Douglas production function, which has been widely used in studies devoted to the determination of productivity factors, has several advantages, including the fact that it makes it possible to determine directly the elasticity of each input in relation to output, or to estimate returns to scale directly (Dia, 2005).

However, it is at the same time a rather restrictive form, since it is based on the hypothesis that production factors are substitutable (Patrick, 1990). However, there are several specifications that allow us to free ourselves from the restrictions imposed by Cobb-Douglas, and for our part, we will use the Trans logarithmic function or Translog as proposed by Christensen, Jorgensen and Lau (1973), which is a limited expansion of any function to order two.

With the Translog, the input and substitution elasticities as well as the returns to scale are no longer fixed a priori. The estimates of this model seem to justify the switch from a Cobb-Douglas production function to a Translog production function (Jorgenson and Lau, 1973). This change involves adding additional terms to the former (the squares of the quantities of factors used and their cross products).

Indeed, the coefficients associated with these additional variables, once all significant and different from 0, the impact on output of a change in the share of jobs of the $_j$ qualification level in total employment depends on capital intensity, the number of employees and the structure of qualifications.

Thus, we can deduce from the estimates, relationships that express the influence of a variation in the qualification structure on productivity as follows:

$$\frac{\ddot{a}Log\,VA}{\ddot{a}AD};\ \frac{\ddot{a}Log\,VA}{\ddot{a}AC};\ \frac{\ddot{a}Log\,VA}{\ddot{a}AM}\ \text{et}\ \frac{\ddot{a}Log\,VA}{\ddot{a}AE}$$

Thus, an increase in the share of a given occupational category of workers in the employment of an MFI will lead to an increase in output, the "more or less strong" the higher the number of

workers. These estimates will allow us to validate our second hypothesis, according to which the management category will have the most important impact on the productivity of MFIs.

When it comes to selecting the factors that explain the dependent variable, a problem can arise. This problem is that of multicollinearity and has important consequences for the quality of the estimates (Mafuku, 2008). Thus, multi-collinearity arises from intercorrelations between the explanatory variables, i.e. when two variables are strongly correlated, it is difficult to separate their effects on the dependent variable: the increase in the dependent variable is hardly attributable to one or other of the variables introduced into the model (Denglos, 2009). This test makes it possible to identify correlated variables. The solution to the problem involves eliminating the variables that are the source of the collinearity by applying the recommended statistical tests for multi-collinearity (Farrar and Glauber, VIF, etc.).

To test for a potential collinearity problem, the VIF test (based on the Variance Inflation Factor) can be operated. It is represented by the following formula:

$$\text{VIF} = \frac{1}{1 - R_j^2}$$

With $R_j{}^2$ the coefficient of multiple determination when the independent variable $x_j$ is regressed on the $k -$

1 other variables.

According to this test, if the degree of tolerance (represented by 1/VIF) is less than 10%, the variable concerned is possibly a linear combination of other explanatory variables in the model. It is based on measuring the degree of correlation of each of the independent variables with the other variables in the model. Thus, the VIF will also be used as it is, to date, the most reliable indicator of this phenomenon and the most widely used (Travels, 2013). It will take the value 10 if the variable in question is explained by the others in a proportion of 90%, 5 if the explanatory power is 80%, 2 if it is only 50%, etc. In the econometric literature, serious problems of multi-collinearity only occur if the VIF reaches or exceeds the value "10".

## Results of the study

Descriptive Analysis

The microfinance sector in North Kivu is made up of 30 MFIs with an average age of 5 years. The characteristics of these MFIs in terms of average weight are assessed at three main levels: value added, volume of work and capital intensity.

Table 4: Descriptive statistics

| | N | Minimum | Maximum | Average | Standard deviation | Variance |
|---|---|---|---|---|---|---|
| VA | 30 | 10,1000 | 19,6000 | 15,145333 | 3,3899636 | 11,492 |
| Int Cap | 30 | 0,8092 | 1,9020 | 1,296390 | 0,3451957 | 0,119 |
| Work | 30 | 9,00 | 14,00 | 11,9000 | 1,64736 | 2,714 |
| N valid (listwise) | 30 | | | | | |

Thus, we can see from the table below that in terms of added value, the proportion in this sector considered over a period of 3 years (2015-2018) is estimated at an average of 15%. In relation to the volume of work, an average of 11 agents per institution are employed. In fact, this sector alone accounts for less than a third of the total contribution in terms of work volume of the Congolese microfinance sector, i.e. 17.7% (BCC, 2016) with a standard deviation of 1.64.

With regard to capital intensity, almost all of this sector is below the overall average (1.296%) of the microfinance industry over the period considered with a standard deviation of 0.3451.

In view of the above, it is necessary to analyse whether the productivity of MFIs is affected by the qualification of the workforce.

Indeed, the estimation of the production function by the OLS method has enabled us to obtain results that are in line with the hypotheses underlying our model and/or economic theory. The labour factor is subdivided in this study into four groups corresponding to the four categories of labour employed in Congolese enterprises.

Table 5: Estimators of the Cobb-Douglas production function by OLS

| Log VA | Coefficient | Std. Err. | T | P>t | 95%Conf. | Interval |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Log INTCAP | 0.9774244 | 0.0097316 | 100.44 | 0.000 | 0.9573394 | 0.9975093 |
| Log AD | 0.137562 | 0.0066535 | 20.68 | 0.000 | 0.1238298 | 0.1512941 |
| Log AC | 0.3225224 | 0.0101733 | 31.70 | 0.000 | 0.3015257 | 0.3435192 |
| Log AM | 0.2442186 | 0.0096083 | 25.42 | 0.000 | 0.2243881 | 0.2640492 |
| Log AE | 0.2198324 | 0.0116793 | 18.82 | 0.000 | 0.1957276 | 0.2439372 |
| Cons | 1.460194 | 0.0212778 | 68.63 | 0.000 | 1.416279 | 1.50411 |
| | | | | Number of obs = 30 | | |
| | | | | F (5, 24) = 573.65<br>Prob > F = 0.0000<br>R-squared = 0.9917<br>Adj R-squared = 0.9900<br>Root MSE = 0.33945 | | |

The Fisher F-test shows that the quality of the model is globally good and the coefficient of determination shows that the significant variables explain 99.1% of the MFIs' productivity (value added). However, the examination of the T-student of individual significance of the variables reveals that all the variables are significant at the 1%, 5% or 10% level.

Given these results, there is evidence of a positive relationship of these types of professional categories on the productivity of microfinance institutions. Thus we have the results that the category of management agents representing 16.1% of the total number of staff in the study sample has a positive, significant and high impact on the variation of the value added of MFIs, with a coefficient (0.137562), proving its major impact on the activity in the sector.

This category also represents 38.1% of the total number of employees in the study sample, and has a very high, significant and positive impact on the variation in the value added of MFIs, with a coefficient of (0.3225224), which is the highest of all the other labour categories. This shows that it is the category that contributes much more to the realisation of value added than the others.

We observe that in the socio-professional category "supervisors", this class occupies 23.73% of the workforce and also has a positive, significant and high contribution to the productivity of the MFIs, with a coefficient of (0.2442186).

Finally, for the last class, which is that of operatives representing 22% of the total workforce, it too contributes significantly and positively to the productive performance of MFIs associated with a coefficient of (0.2198324) is also high, positive and significant.

Analysis of the influence of turnover variation on MFI productivity

The OLS estimators allow us to observe that capital or capital intensity positively and significantly affects the productivity of these MFIs. Indeed, the capital factor has a strong influence on MFIs. The coefficient associated with this factor of production is 0.97. It is very high, positive and statistically significant. It is very high, positive and statistically significant. The order of magnitude thus obtained is in line with that usually obtained in the literature.

On the basis of this result, we can conclude that, despite the low capital intensity of most of the MFIs in North Kivu, the capital that is regularly committed makes an important contribution to the productivity of the MFIs. The additional turnover that would thus be generated, following an increase in value added, could allow these enterprises, over the years, to expand their activities and consequently to resort to additional production factors (Patrick and Yves, 2014).

Analysis of the elasticity of output with respect to different categories of labour

As we use a Cobb-Douglas production function, it should be noted that the impact on output of a variation in the share of the different labour categories is assumed to be the same for all the firms we hold. This seems difficult given that these different MFIs are heterogeneous. This is why we use a Translog formulation, as it takes into account the specificities of the different MFIs, and thus allows us to arrive at particularly nonidentical elasticities. These are shown in the following table:

Table 6: Elasticity of labour categories

| | AD | AC | AM | AE |
|---|---|---|---|---|
| 1 | 2,8478 | 1,8386 | 2,4211 | 2,4211 |
| 2 | -14,2465 | 1,6708 | 3,6694 | 2,7440 |
| 3 | -3,3946 | 1,9898 | 1,8435 | 2,4240 |
| 4 | 2,5021 | 1,9044 | 2,9198 | -2,5021 |
| 5 | 4,1907 | 1,9010 | -2,1812 | 2,4621 |
| 6 | 3,1599 | 1,9269 | 2,2742 | 2,6347 |

| | | | | |
|---|---|---|---|---|
| 7 | 3,6837 | 1,9962 | -1,7601 | -3,6837 |
| 8 | 27,8658 | 2,4880 | 3,1922 | 2,6724 |
| 9 | -3,6949 | 2,3312 | 2,0217 | 2,8224 |
| 10 | -3,9819 | 3,4885 | 3,0057 | 3,9819 |
| Average | 1,8932 | 2,1535 | 1,7406 | 1,5977 |

In view of the above table, we believe that the impact of the change in the P&MS category would be even greater than that of the other classes of the workforce and would thus imply a low weight of managers and supervisors. This positive impact of P&MS on their own performance is an intuitive result given the presumption we made at the outset that it was more logical to expect an increase in P&MS performance when their numbers increased. As shown by Dia A. (2005) and our own results, managers have a large share in MFIs.

Relying on the Translog estimates, these allow us to estimate the elasticity of output with respect to the different labour categories. The different values obtained for these average elasticities as presented in the above table can therefore simply be interpreted as the rate of change in output following a one-unit increase in the share of managers, professionals, supervisors and workers (Dia 2005).

When these elasticities are related to the manpower allocations of the various MFIs, it can be seen that the elasticity of professional and managerial staff (see appendix: table 11) is all the stronger as the weight of professional and managerial staff is itself high (the average rate is in fact 2.15) and that the elasticity of supervisory staff is inversely related to the share of professional and managerial staff (the correlation coefficient here is 0.227.

Some of the results of these analyses are the growth in the marginal productivity of P&MS and the complementarity between P&MS and supervisors (the impact of supervisors is inversely proportional to the weight of P&MS).

On the other hand, when these elasticities are related to other structural characteristics, the results obtained are convincing. For example, there is a strong overall link between the elasticity of production in relation to the different categories of labour and capital intensity. The correlation

coefficient between the elasticity of managers and capital intensity is -0.28, while the correlation coefficient between capital intensity and the elasticity of supervisors is only -0.27.

Multicollinearity test

| Variables | Co-linearity statistics | |
|---|---|---|
| | Tolerance | VIF |
| AD | 0,888 | 1,126 |
| AC | 0,757 | 1,321 |
| AM | 0,769 | 1,300 |
| AE | 0,880 | 1,137 |
| Int CAP | 0,715 | 1,398 |

The VIF test performed after the ordinary least squares regression shows that there is no multi-collinearity in the variables when the VIF is less than 10. However, all the variables with a VIF less than 10.

## Conclusion

The objective of this paper was to empirically determine the link between the different classes of labour and productivity in the microfinance sector. To do this, a production function analysis, which quantifies the links between factors of production and final output, was carried out. In order to achieve this objective, the Cobb Douglas type production function analysis was used with the MC0 and the logarithmic function. The results showed that there is a positive relationship of the types of professional categories on the productivity of microfinance institutions. Thus, the category of management agents has a positive, significant and high impact on the variation of the value added of MFIs, with a coefficient (0.137562. In addition, management staff have a higher, significant contribution to the productivity of MFIs due to their level of education.

The extension of the analyses, through the OLS estimators, also shows that capital or capital intensity positively and significantly affects the productivity of these MFIs with an associated coefficient of 0.97. Using the Translog estimates to estimate the elasticity of production in

relation to the different categories of labour, the results show that the elasticity of managers is all the stronger as the weight of managers is itself high (the average rate is in fact 2.15) and, on the other hand, that the elasticity of supervisors is inversely related to the share of managers (the correlation coefficient is 0.227).

The originality of this paper is firstly to fill the gap in the issue of the qualification of the workforce on performance in the microfinance sector in North Kivu and to test the contribution of certain professional categories in the North Kivu microfinance sector on performance.

## Bibliography

Andrew J. (2005). Productivity and Human Capital for the "Bottom Third", in International Productivity Monitor, Quebec.

Appleton, S. (1997), "Human capital and economic development", Background paper prepared for the African Development Report, mimeo, 29 pages.

Baker, S. (2002), Laddering: Making Sense of Meaning, In: Partington D. "Essential Skills for Management Research". London: SAGE Publications, pp. 226 - 253.

Becker, G., Human Capital, A Theoretical and Empirical Analysis, with Special Reference to Education,
NBER-columbia University Pess, 1964, 187p

Becker, G.S & Chiswick, BR. (1966), "Education and the distribution of earnings", American economic review, Proceedings, 56: 358-369.

Becker, G.S. (1975), Human capital, The university of Chicago Press.

Berguiga, I. (2010), Determinants of the social and financial performance of microfinance institutions in the mena region: a snapshot analysis

Bouoiyour, J., & Toufik, S. (2007). The impact of foreign direct investment and human capital on the productivity of Moroccan manufacturing industries. Region and Development, 25, 115-136.

Bourdieu, P. (1980). Le sens pratique, Les Éditions de Minuit, Collection Le sens commun, Paris, 475 pages.

Cappelletti, L. (2010). Towards a socio-economic model of human capital measurement? Revue française de gestion, 207, (8), 139-152. https://www.cairn.info/revue-francaise-de-gestion-2010-8-page-139.htm. De La Fuente, A. (2011). Human capital and productivity. Nordic Economic Policy Review, 2(2), 103132.

Dia, A. (2005), niveaux de qualification de la main d'œuvre et productivité des entreprises au sein du secteur industriel sénégalais, Clermont Ferrand.

Freyssenet, M. "peut-on parvenir à une définition unique de la qualification?", in Commissariat Général du Plan, la qualification du travail, de quoi parle-t-on? Paris, la documentation française, 1978, pp 67-79.

Foray, D. (2000). L'éconoomie de la connaissance, Ed. Eyrolles, Paris

Fourastié, J. (1952), La productivité, Collection Que sais-je ? N° 557, PUF, Paris.

Gendron, B. (2008). Capital émotionnel et éducation, Dictionnaire de l'éducation, Van Zanten A. (dir.), PUF, Paris

Guillard, A. & Roussel, J. (2010), Le capital humain en gestion des ressources humaines: éclairages sur le succès d'un concept. Management & Avenir, 31, 160-181. https://doi.org/10.3917/mav.031.0160

Jérôme, G. Le capital humain, Multitudes 2000/2 (No. 2), pp. 111-112.DOI 10.3917/mult.002.0111 Komenan A. (1987), Education, experience and wages in Côte d'Ivoire: An analysis from the 1984 labour force survey, Discussion Papers 99, World Bank.

Logossah, A. (1994), Human capital and economic growth: a review of the literature, Economie et Prévision, n° 116, p. 17-34.

Mairesse, J. and Sassenou, M. (1989), Les facteurs qualitatifs de la productivité: un essai d'évaluation,

Economie et Prévision, n° 91, p. 35-42

Mairesse, J. and Cuneo, P. (1985), Recherche-développement et performances des entreprises: une étude économétrique sur données individuelles, Revue Economique, n° 5, p. 1001-1041.

Mbaye, A. (2002), Capital humain, compétence et productivité du travail au Sénégal: une analyse empirique, Economies et Sociétés, Série F, n°40, Développement - IV, 3/4, p. 567-588.

Mincer, J. (1958), "Investment in human capital and personal income distribution", Journal of political economy, 67: 281-302.

Naville, P., Essai sur la qualification du travail, Paris, 1956,148p

OECD Report (1996): Measuring Human Capital - Towards an accounting of acquired knowledge,

OECD Report (1998) Investment in Human Capital - An International Comparison

Romer, P. (1989), Increasing Returns and New Developments in the Theory of Growth, in National bureau of economic research, DOI 10.3386/w3098

Steven, L. (2007), A new view of institutions, human capital, and market standardization, Education, Knowledge and Economy, vol. 1, no. 1, pp. 93-105.

Sevestre, P. (1990), Qualification de la main-d'oeuvre et productivité du travail, Economie et Statistique, n° 237-238, p. 109-120.

Stephen, G. and Pascal, L. Usage des indicateurs de capital humain et pilotage de la performance, Revue française de gestion 2010/8 (n° 207), p. 125-138.

Van and Vijverberg (1987), Wage determinants in Cote d'Ivoire, LSMS Working Papers 33, World Bank.