

SMEs and the Provision of Basic Social Services in the Republic of Congo

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ABSTRACT : The results showed that SMEs whose owners have a higher level of education contributed to the construction of educational infrastructure and job creation, compared to SMEs whose owners do not have a higher level of education. Conversely, SMEs whose owners are satisfied with their business are less likely to contribute to the construction of educational and healthcare infrastructure and job creation, compared to SMEs whose owners are dissatisfied with their business. This disparity can be explained by the fact that when an SME owner is satisfied with their business, it does not necessarily mean that their company generates sufficient financial surpluses to fund the construction of educational infrastructure. Satisfaction may stem from the stability of the business, the level of employee income, or the control they exercise over their business, and not necessarily from the profit margin, which may be limited.

KEYWORDS : SME, social services, poverty

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INTRODUCTION

In the Republic of Congo, sustainable poverty reduction remains a major objective of public development policies. While economic growth is a necessary condition, it is insufficient if it does not translate into effective improvements in people's living conditions. Access to basic social services, particularly the construction of educational, health, and water supply infrastructure and job creation, plays a decisive role in combating household poverty.

The production and provision of these services are essential for the accumulation of human capital and the participation of populations in the economy. Access to safe drinking water reduces morbidity and health expenditure, thereby freeing up financial resources and productive time, particularly for women and children. Similarly, access to educational services improves opportunities for learning, income-generating activities, and integration into the labor market. Thus, basic social services are not only social goods, but also essential factors in reducing multidimensional poverty.

In this context, small and medium-sized enterprises (SMEs) appear to be key players in the provision of basic social services in the Republic of Congo. Due to their proximity to households, SMEs are often better placed to respond to local needs, particularly in areas where public intervention remains limited. Their adaptability, organizational flexibility, and potential for innovation promote the development of vulnerable populations.

In doing so, the contribution of SMEs to the provision of basic social services helps to reduce poverty on several levels. First, it improves access to and the quality of essential services, which directly improves the living conditions of poor households. Second, SMEs generate local jobs and stable incomes, thereby contributing to economic inclusion. Third, by structuring local value chains in labor-intensive sectors, they promote more inclusive growth.

However, despite this potential, the contribution of SMEs to poverty reduction through the provision of basic social services remains undervalued and under-supported. Constraints on access to finance, weaknesses in technical and managerial capacities, and the lack of appropriate incentive mechanisms limit their ability to operate on a large scale while maintaining the affordability of services for poor households.

Therefore, analyzing the role of SMEs in the provision of basic social services is a strategic lever for strengthening the effectiveness of poverty reduction policies in the Republic of Congo. By highlighting the mechanisms through which these enterprises contribute

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to improving the well-being of populations and economic inclusion, this reflection aims to inform public policy choices and promote partnership models capable of reconciling economic performance, social impact, and sustainable development.

This article is structured in three parts. The first section reviews the literature. The second section describes the methodology used, highlighting the data sources and the choice of variables. The results and their interpretation are presented in the third section.

II. REVIEW OF THE LITERATURE ON SMES AND THE PROVISION OF BASIC SOCIAL SERVICES

Understanding the link between SMEs, the provision of basic social services, and poverty reduction requires an in-depth analysis of existing theoretical and empirical contributions on educational, water supply, and sanitation infrastructure, as well as job creation.

A. Educational infrastructure as a channel for poverty reduction

The work of Hong Zuo et al. (2023) analyzed the effects of intergenerational education. Applying an estimation, the authors arrived at the following results: the probability of offspring experiencing poverty decreases as the length of compulsory education increases by one semester. Education is therefore likely to halt the intergenerational transmission of poverty. The effects of education on the incidence of poverty are mainly observed in rural areas and among women, while no significant effect is observed in urban areas and among men.

Aloysius Mom Njong (2010) analyzed the relationship between work experience, education, and poverty in Pakistan. The results of his work show that improved experience and education levels reduce the likelihood of poverty among employed people. From a gender perspective, the study concludes that a man's level of education reduces poverty more than a woman's. Education is a multidimensional process: on the one hand, it stimulates economic growth and, on the other, it reduces poverty by increasing labor productivity. However, poverty is out of control in rural areas of Pakistan, where people are deprived of income, clothing, housing, healthcare, and educational infrastructure. In contrast, Sikander Pervez (2014), using time series of annual observations, shows that literacy rates and gross enrollment rates (secondary) have a negative and significant impact on long-term poverty, while life expectancy has a positive impact.

Edeh et al. (2012) analyzed the relationship between education spending and poverty in Nigeria. Their findings reveal that education spending had no impact on poverty reduction during the period studied. The current government's efforts to eradicate poverty are not bearing fruit. Nigeria's annual education budget would need to be increased by around 25% over the next ten years for the effects of education spending to be felt.

In the same vein, Abdelrahim (2023) analyzes the link between education and poverty in Sudan. The main findings of his study confirm the link between education and poverty reduction; basic education provides comprehensive skills and applies concepts and values associated with poverty reduction. To achieve this, policies and strategies must be rethought to better serve people affected by poverty, displacement, and lack of education in Sudan.

The work of Sampuara and Ananda (2021) analyzes the influence of education level and socioeconomic characteristics on household poverty in the Riau Islands province. Using the multinomial logit model, the authors analyze the factors that influence the incidence of household poverty based on data from the 2018 Indonesian National Socio-Economic Survey. The results show that the probability of being poor in the Riau Islands province is mainly influenced by the head of household's level of education and employment status.

In a relatively recent study based on data from the 2018 Vietnamese Household Living Conditions Survey, Hung Van Vu (2020) examines the impact of education on household income in rural Vietnam. Regression analyses show that education has a positive effect on household income, even after taking various factors into account in the models. Similarly, households whose head of household has higher qualifications or vocational training tend to earn higher incomes. According to Monchuk (2015), rural households are more prone to poverty due to generally lower access to social and economic services and more frequent engagement in agricultural activities than urban households. Indeed, large households with low human capital are more prone to poverty than others.

Human capital derived from education can contribute to poverty reduction through indirect effects via health and income distribution channels. Indeed, several studies have highlighted the existence of a strong link between an individual's health status and their participation in the labor market (Schuring et al., 2007). This literature notes that workers who are in good physical condition (good health) have relatively higher levels of productivity and therefore earn higher wages. In addition, these individuals have greater mobility in the labor market compared to their less educated and less healthy peers.

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B. Water supply infrastructure as a channel for poverty reduction

Water supply infrastructure plays a specific role in poverty reduction. Its crucial importance is based on the fact that: (i) it has positive externalities on the health of populations; (ii) it contributes to improving household productivity and has a positive effect on children's education; (iii) it contributes to improving household well-being; (iv) it has a positive effect on economic growth.

A safe and convenient water supply prevents the spread of many serious diseases, such as diarrhea, which is a major cause of infant mortality and malnutrition. According to the UNICEF and WHO report (2009), approximately 1.5 to 1.6 million children die each year from diarrhea, largely related to the consumption of unsafe water.

According to these institutions, improving access to safe drinking water in developing countries would lead to a reduction in infant mortality; improved maternal health, as unsafe water and poor hygiene pose a major threat to the health of mothers after childbirth; and combat the spread of HIV/AIDS—safe water, adequate sanitation, and good hygiene are essential for treating diseases and preventing their spread.

These problems are particularly acute in Congo. Mortality among children under 5 is high (125 per 1,000), and maternal mortality is among the highest in sub-Saharan Africa (781 per 100,000 live births). Using data from a household survey in Mauritania, Angel-Urdinola and Wodon (2006) showed that 40% of individuals' time was spent on non-remunerative activities (household chores, transportation, etc.). If there were universal access to running water in this country, the time spent on household activities would decrease from 12.1 hours to 10.8 hours for poor households and from 9.1 to 8.6 hours for non-poor households. Thus, universal access to running water would lead to a time saving of nearly 11% on household activities for poor households, time that could be usefully devoted to productive activities and would lead to a reduction in poverty. School-age children are also affected. In Guinea, children aged 6 to 14 spent an average of 7.8 hours per week on household activities, including 1.7 hours searching for water (Bardasi and Wodon, 2005).

Access to running water improves household well-being. As already pointed out, this improvement is achieved through better sanitary conditions and increased household productivity, which leads to poverty reduction. For example, analysis of the determinants of poverty in Congo has shown that the time spent accessing drinking water is negatively correlated with household well-being, measured by consumption per adult equivalent (World Bank, 2007). An additional minute would reduce well-being by nearly 0.008%. This result is not isolated and is confirmed in other countries such as Cameroon, the Central African Republic, etc. Furthermore, it has also been shown that access to public utilities (electricity, running water) increases the imputed value of housing for owner-occupied households, which leads to an increase in well-being and a decrease in poverty (Estache and Wodon, 2007).

When considering running water, the results for these three countries show that the rental value of housing would increase by one-third, two-thirds, and one-fifth, respectively, in each of these three countries when the housing is connected. Well-being (measured by per capita consumption) would increase by 1.5%, 5%, and 0.8% in Mauritania, Rwanda, and Sao Tome and Principe, respectively, with a greater increase for the poorest households. Finally, this increase in well-being would lead to a reduction in poverty among households that do not currently have access to these amenities of 0.7, 1.7, and 0.8 percentage points respectively in each of the countries.

This relationship between individual poverty and lack of access to water is described as reciprocal insofar as about one-third of individuals without access to water live on less than one dollar a day and two-thirds have less than two dollars a day.

Finally, there is a positive correlation between economic growth and access to drinking water (Estache, Speciale, and Veredas, 2005). In general, access to infrastructure has a positive effect on growth, if only because it lowers transaction costs. The causal link between infrastructure and access to running water is less obvious. However, the fact that access to water improves human capital through its positive effect on education and health may justify this positive correlation.

C. Health infrastructure as a channel for poverty reduction

Health infrastructure (medical offices, clinics, integrated health centers, drug supply systems, basic hospitals, and general hospitals, etc.) plays a central role in the trajectories of poverty reduction or entrenchment. Theoretically, Becker (1964, 1981) and Grossman (1972) laid the foundations for the link between health and human capital. Health, considered as a stock of human capital, directly influences individuals' productivity and income. Health infrastructure reduces morbidity, thereby promoting income generation and poverty reduction. This approach has been complemented by Amartya Sen's (1999) capability theory, which defines poverty not only as a lack of resources, but also as a lack of real opportunities.

The work of Preston (1975) and Esrey et al. (1991, 1996) highlight the role of health infrastructure in improving public health. Access to well-equipped health centers and sanitation services reduces mortality and morbidity, particularly among children, and decreases households' exposure to catastrophic health expenditures, a major factor in impoverishment. According to Gertler and

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Gruber (2002), the lack of reliable health infrastructure increases the risk of falling into poverty following health shocks, while a safe health environment protects vulnerable households.

Beyond the direct impact on health and income, health infrastructure influences human capital and long-term poverty reduction. Miguel and Kremer (2004) showed that improving child health through health interventions such as combating parasitic infections increases school attendance and academic achievement.

Ogun (2020) studied the impact of infrastructure development on poverty reduction in Nigeria, specifically examining the relative effects of physical infrastructure on living standards. The author uses secondary data for the period 1970 to 2005, employing the structural vector autoregressive (SVAR) model. The results of this regression show that infrastructure development leads to poverty reduction. Furthermore, Moneme et al. (2024) examine the effects of infrastructure on poverty in Nigeria from 1999 to 2022, using ordinary least squares (OLS) regression. The results of their work indicate that infrastructure development did not contribute to poverty reduction during the period studied. More clearly, the results of the OLS regression revealed mixed results regarding the nature of the relationship and the extent of the effects of infrastructure on poverty reduction. Although the test validated the results that infrastructure development does not contribute to poverty reduction, it also showed that a 0.58% increase in the poverty level is associated with infrastructure development in Nigeria.

D. Job creation by SMEs and poverty reduction

SMEs contribute to maintaining and securing existing jobs and, at the same time, to creating new ones. Since job creation is a priority for governments in almost all countries, the job creation capacity of SMEs is therefore of major interest to most of them. Indeed, the role of SMEs in job creation and poverty reduction has been the subject of several research studies.

In the OECD area, SMEs play a major role in economic growth and are responsible for creating most new jobs. According to the OECD (2000), more than 95% of businesses in this area are SMEs. They account for 60-70% of employment in most countries. As large companies reduce their workforce and increasingly outsource functions, the weight of SMEs in the economy is growing. Furthermore, productivity growth, and therefore economic growth, is largely driven by competition linked to the birth and death, entry and exit of small businesses. The high rates of job turnover and labor market churn that this implies are an important part of the competitive process and structural change. Less than half of new small businesses survive more than five years, and only a fraction form the core of high-performing companies that drive innovation and industrial performance. This is why it is important for public authorities to reform the policies and conditions that govern the creation and expansion of businesses in order to optimize their contribution to growth.

According to Pfeffermann (2001), finding a job or a better job is one of the changes most closely linked to economic improvement. Job creation is a crucial element in the fight against poverty. It is businesses, whether new, very small companies or larger companies growing in an expanding economy, that create the most sustainable jobs. In almost all developing countries, including China, private companies are the source of most new jobs. These companies, large and small, domestic and foreign, operate in all sectors of activity. Although public sector jobs also contribute to income mobility, deliberate attempts to create jobs, whether by central government or public enterprises, have almost always been doomed to failure. Public enterprises are generally loss-making; in the long run, many go bankrupt or drain public finances.

According to Aubin et al. (2013), employment is undoubtedly a lever for escaping poverty. It contributes significantly to social integration and mobility, wealth distribution, and social cohesion. However, it cannot be considered the only solution to the problems of people excluded from the labor market.

First and foremost, it is desirable for everyone to achieve economic independence and have sufficient income to move beyond mere survival. Even if some people are unable to hold a permanent full-time job, or even a traditional part-time job, they must nevertheless have sufficient resources to participate fully in society and live with dignity.

Public policies, particularly in the areas of employment, education, health care, child care, public transportation, and housing, are extremely important. They are crucial to enabling integration and job retention, as well as to bringing about real improvements in the living conditions of workers and all individuals and families living in poverty. They are an expression of solidarity that promotes greater social cohesion, which benefits society as a whole. The Quebec model that emerged from the Quiet Revolution remains unique in North America. It has proven its worth, particularly during the recent economic crisis, and deserves to be preserved and even improved.

Employment must provide a means of escaping poverty, and indeed of doing so in a sustainable manner. Furthermore, a decent income that allows people to live with dignity is a prerequisite for integration into the workforce and civic participation. In its opinion on targets for improving the income of individuals and families, the Committee has already proposed an integrated income support system that would make it possible to achieve this objective.⁶ Without the resources and means to meet their basic

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needs, people remain in a state of survival, in a state of human deficit that compromises their ability to acquire and maintain their autonomy or to integrate and participate in society.

"Work is a key factor in the economic well-being of individuals. More than just a source of income, work contributes to socioeconomic progress and strengthens individuals, their families, and their communities. However, this progress is only possible if the work is decent¹."

In Quebec, the majority of people living in poverty participate little in the labor market or are completely excluded from it. However, over the past two decades, both in Quebec and in other Western societies, there has been a downward trend in poverty in general and, conversely, an upward trend in poverty among workers².

According to Pierre-Joseph Ulysse (2009), "this is neither an individual nor a marginal phenomenon, but rather the result of major social, political, and economic transformations in society. The working poor are primarily workers whose employment conditions do not allow them to escape poverty. They share many characteristics with the poor as a whole: precarious housing conditions, insufficient material resources, excessive debt, little protection against social risks, and a relative lack of social and economic participation. Full-time workers have difficulty paying their bills (gas, telephone, electricity). They use food banks. They are unable to pay their rent regularly or follow medical prescriptions³."

According to the ILO (2000), decent work is the first step out of poverty and an important step towards social integration. It is at the heart of the three major issues addressed by the Social Summit. Furthermore, access to decent work is the most widespread aspiration in all countries. The globalized economy must therefore offer everyone, men and women alike, the opportunity to access decent and productive work in conditions of freedom, equity, security, and dignity. The four objectives of the ILO's decent work agenda are to promote job creation, fundamental rights at work, social protection, and social dialogue. Achieving these four objectives is essential to meeting the goals set in Copenhagen, namely poverty reduction, full employment, and social integration. An integrated approach involving many organizations in the international system is needed to promote decent work. The Special Session of the General Assembly is therefore invited to call on all States and international organizations to support the following key elements of the ILO's global decent work agenda.

ILO programs aimed at promoting job creation take into account the key role played by small enterprises in this area. This is a reality that all countries, regardless of their level of development, are gradually recognizing. In order to play their full role in the field of employment, small enterprises must be viable and productive. More attention should be given to the best ways of improving the policies and the regulatory and institutional framework needed to stimulate and facilitate their growth. Working conditions are notoriously poor in many of these enterprises because they generally escape the reach of trade unions and labor inspections. Small enterprise owners and managers therefore need access to advisory services and technical cooperation activities that will show them how they can increase their productivity by improving the quality of employment, training, and the working environment.

The ILO's Focus Program on promoting employment through small enterprise development is based on the observation that these enterprises are the world's largest potential source of jobs. It aims to promote the creation and growth of small enterprises and to encourage the improvement of job quality, gender equality, and the creation of inter-enterprise networks and representation. The creation of productive jobs and income distribution are essential aspects of reducing household poverty and ensuring sustainable and equitable development. It is becoming increasingly important to address inequalities and employment issues (UNCTAD, 2013). Wage and skill gaps generally appear to be more pronounced in service companies, which cover a wide range of activities, than in agriculture or industry. In developing countries, the retail trade employs few people in supervisory, managerial, or executive positions. In Indonesia, for example, 80% of employees in this sector are informal. The situation is similar in construction, hotels and restaurants, and road transport, particularly in terms of lower-than-average education levels. Business services offer above-average wages and a high proportion of employees with higher education qualifications.

The World Bank's 2017 report on the diagnosis of the employment situation in Côte d'Ivoire, focusing on employment, productivity, and inclusion, showed that companies with more than 100 employees provide almost 70% of jobs. This finding is consistent with the conclusions of the February 2014 employment survey, which attributes more than 75% of formal employment

¹ International Labor Organization, The Decent Work Agenda, <http://www.ilo.org/global/about-the-ilo/decent-workagenda/lang--fr/index.htm> [page accessed on July 23, 2012]

² Pierre-Joseph ULYSSE, «The working poor: from precariousness to poverty in employment. An overview in Canada/Quebec, the United States, and France," Lien social et Politiques, no. 61, Spring 2009, p. 82. 11. Presentation at the conference.

³ Presentation at the retreat organized by the Advisory Committee on February 7, 2012. Pierre-Joseph Ulysse is a professor at the School of Social Work at the University of Montreal in the field of social protection.

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to medium and large enterprises. Similarly, the share of jobs generated by enterprises that have been in operation for more than ten years is equally significant. Less than 10% of formal jobs are located outside Abidjan. The majority of jobs are in low-skilled activities.

The service sector generates most formal jobs. However, agribusiness and manufacturing still contribute significantly to total formal private employment. In 2012, the agribusiness sector accounted for only 4% of enterprises but generated 18% of jobs. This finding is consistent with the Report on Growth and Competitiveness for the Manufacturing Sector, which highlights the crucial importance of agribusiness, both in terms of value added and employment, based on the 2010 census (World Economic Forum et al., 2015).

In terms of net formal job creation, the overall trend has been positive since 2006, but overall, few new jobs have been created in the formal sector. Indeed, with the massive increase in the number of businesses since 2007 based on the entry of smaller businesses, total net job creation has been rather limited. Highly skilled activities are proving to be more stable than the overall level of net job creation. The pace of net job creation has been more consistent for higher-skilled jobs over the entire reference period, including in years when lower-skilled jobs experienced sharp fluctuations.

In a policy note, Tall (2018) analyzes the link between employment and poverty. According to the author, the incidence of poverty, according to the latest statistical data, has decreased slightly from 47.2% in 2015 to 46.8% in 2016. Since 2013, the poverty rate has fluctuated around 47%. Poverty affects more than 8 million people in Mali. Increasing the incomes of the poor requires that they have employment or self-employment and that they participate in income-generating activities that are adapted to market demand. A necessary condition for reducing poverty and inequality in Mali is therefore the achievement of growth that creates jobs and income-generating activities for the poor, taking into account environmental challenges, including those related to climate change, i.e., inclusive and sustainable growth.

II. METHODOLOGY

The methodology used is based on three main points. The first point presents the data source and sample characteristics. This step consists of describing the origin, nature, and size of the sample, as well as the reliability of the information collected, while detailing the criteria for selecting respondents. The second point addresses the indicators used to operationalize the model's concepts, while systematically describing the procedures for measuring the variables. These include both dependent variables, representing the phenomenon to be explained, and independent variables, corresponding to the explanatory or determining factors assumed to influence these phenomena. Finally, the last point consists of presenting the empirical models used in the analysis. These models are used to test the hypotheses that have been formulated in order to evaluate and estimate the coefficients of the various equations selected. Their specification is based on clearly defined theoretical and econometric foundations, thus enabling the results to be interpreted in a reliable and relevant manner.

II.1. Data source

The data for this research comes from a survey of SME owners. This survey was designed to collect direct, reliable, and contextualized information to better understand the phenomenon of poverty reduction through SMEs.

The survey was conducted using a structured questionnaire, developed on the basis of the research objectives and hypotheses. This questionnaire comprises several sections designed to capture the main variables of the analysis model, whether dependent or independent variables. It was administered to a sample of the target population, SME owners, representing 120 SMEs.

Data collection took place mainly in the capital city, Brazzaville, where the majority of SMEs are concentrated. This first-hand information provides a realistic view of the field and allows the research hypotheses to be tested empirically.

II.2. Choice of variables

- Endogenous variables

The phenomenon studied in this study is poverty reduction through SMEs. Poverty reduction will be achieved through four transmission channels, namely the construction or non-construction of educational, health, and water supply infrastructure and the creation or non-creation of jobs by SMEs.

Indeed, the construction of educational, health, and water supply infrastructure and the creation of jobs are essential levers for poverty reduction. Access to quality education promotes skills acquisition and increases individual productivity, which is a necessary condition for poverty reduction. Similarly, health infrastructure improves the health of populations, while reducing productivity losses due to illness and strengthening the ability of populations to participate fully in economic life. In addition, the provision of water in Brazzaville's neighborhoods, particularly through the construction of numerous boreholes, improves people's quality of life while ensuring their health through the consumption of safe drinking water and preventing all kinds of diseases. The

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number of kilometers that must be traveled to obtain water is reduced, which in turn reduces the degree of hardship. Job creation by SMEs is a source of income for the surrounding populations. This income helps to meet their needs and reduces the vulnerability of households in the long term.

From the above, four endogenous variables are taken into account: (i) whether or not to build educational infrastructure, (ii) whether or not to build water supply infrastructure, whether or not to build sanitation infrastructure, and whether or not to create jobs.

- Exogenous variables

Exogenous variables are factors that are believed to influence phenomena. The table below presents the endogenous and exogenous variables used in this research, their nature, and their variability.

Table 1 : Endogenous and exogenous variables

Endogenous variables		
Variables	Nature of variable	Variability
Construction of educational infrastructure	Dichotomous	1 : yes ; 0 : no
Construction of health infrastructure	Dichotomous	1 : yes ; 0 : no
Construction of water supply infrastructure	Dichotomous	1 : yes ; 0 : no
Job creation	Dichotomous	1 : yes ; 0 : no
Exogenous variables		
Gender	Dichotomous	1: male; 0: female
Level of education	Dichotomous	1: higher education; 0: no higher education
Marital status	Dichotomous	1: married; 0: unmarried
Financing method	Dichotomous	1: own resources; 0: not own resources
Turnover	Discrete	Quantitative
Satisfaction with the activity	Dichotomous	1 : yes ; 0 : no
Age	Dichotomous	1: over 50; 0: under 50

Source : Author

II.3. Theoretical foundations of discrete choice models

In a choice decision-making process, the goal of the decision is to find the best solution among the possible alternatives in order to satisfy the objectives (Hakim, 2001). In practice, there are two types of choice. The first type is continuous choice, in which a combination of possible alternatives is chosen, with the quantities for each alternative varying continuously. The second type is discontinuous (discrete) choice, in which only one alternative is chosen from among many alternatives.

Assuming that the consumer can compare all possible alternatives, there is a utility function U that mathematically expresses the consumer's preferences. Furthermore, if we designate the set of alternatives available to the n decision-makers during the decision-making process as the choice set C_n , where U_{in} represents the utility of decision-maker n for alternative i , we can define the utility function in terms of attributes:

$$U_{in} = U(Z_{in}) \quad (1)$$

Where Z_{in} is the vector of attributes for alternative i estimated by loader n

Thus, for decision maker n , alternative i is chosen if and only if:

$$U_{ni} > U_{nj}, \forall j \neq i, i, j \in C_n \quad (2)$$

In reality, individuals do not select the same alternative when the same choice trial is repeated, or with the same set of choices, the same attributes, and the same socioeconomic characteristics; different individuals will choose different alternatives. To explain this inconsistency in preferences, probabilistic choice theory is introduced, as it is assumed that human behavior is inherently probabilistic or that we lack more precise information about the individual decision-making process. The probabilistic mechanism can capture the effects of unobservable variations among decision-makers and unobservable attributes of alternatives, and it can also take into account stochastic behavior and errors caused by the data collection method. Thus, because of the probabilistic characteristics of the choice decision, we cannot know exactly which alternative a decision maker will choose within the decision-

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making process, but we can know the probability that a decision maker will choose the alternative. Since we always assume that individuals select alternatives with the highest utility, the probability that a decision maker will select alternative i will be equal to the probability that the utility of alternative i is greater than that of the other alternatives, namely:

$$P_i = P_i(U_i > U_j) \quad \forall j \neq i \quad (3)$$

However, utilities are not known with certainty, so they are treated as random variables. In this case, the random utility function of an alternative is broken down into two parts:

$$U_{in} = V_{in} + \varepsilon_{in} \quad (4)$$

We assume that the deterministic component V can be adequately described by a linear function of the explanatory variables :

We have :

$$U_{in} = X_{in} + \varepsilon_{in} \quad \text{pour } i = 1, \dots, j_n \quad (5)$$

Where X_{in} is a vector of explanatory variables of dimension $(1, K)$ representing the characteristics of the individual ; β is a vector of parameters to be estimated of dimension $(K, 1)$.

Based on utility theory, the individual n will choose, from among the J options available to them, the one that provides them with the highest utility. From this perspective, the discrete choice model is described by a variable y , which indicates the observed choice i , $i=1, \dots, J_n$, and by the latent variables U_{in} that govern this choice :

$$y_i = \begin{cases} 1 & \text{si } U_{ni} \geq U_{nj}, \text{ pour } j = 1, \dots, j_n \\ 0 & \text{sinon ; et} \end{cases} \quad (6)$$

$$U_{in} = V_{in} + \varepsilon_{in}$$

If individual n chooses modality i , the probability $P_n(i)$ of observing this choice is defined as follows :

$$\begin{aligned} P_n(i) &= P(U_{in} = \max U_{jn}) = P(U_{in} \geq U_{jn} \text{ pour } j = 1, \dots, j_n) \\ &= P(\varepsilon_{jn} - \varepsilon_{in} \leq V_{in} - V_{jn} \text{ pour } j = 1, \dots, j_n) \end{aligned} \quad (7)$$

By making assumptions about the joint probability distribution of the error terms ε_{in} , $i=1, \dots, J$, we can derive all the usual multinomial choice models. In general, the probability $P_n(i)$ is equal to:

$$P_n(i) = \int_{D_{1n}} f(\varepsilon_{1n} \dots \varepsilon_{jn^n}) d\varepsilon_{1n} \dots d\varepsilon_{jn^n} \quad (8)$$

$$\text{Où } D_{1n} = \{(\varepsilon_{1n}, \dots, \varepsilon_{jn^n}) / \forall j \neq i, \varepsilon_{jn} - \varepsilon_{in} < V_{in} - V_{jn}\}$$

and $f(\varepsilon_{1n}, \dots, \varepsilon_{jn^n})$ denotes the density function of the random terms. For disaggregated choice analysis, the most commonly used models are logit and probit models.

- Binary logistic regression

Binary logistic regression was used given the dichotomous nature of the dependent variable (Zalle, 2017). In this case, the researcher predicts the probability of event y occurring p ($y=1$) relative to the probability of it not occurring $[1 - p$ ($y=1$)] or p ($y=0$) among the subjects studied. In other words, the odds ratio (OR) is calculated using the following formula: $OR = p$ ($y=1$) / $[1 - p$ ($y=1$)]

The logit model uses the function:

$$p(x_1, \dots, x_k) = \frac{\exp(\beta_0 + \beta_1 + \dots + \beta_k)}{1 + \exp(\beta_0 + \beta_1 + \dots + \beta_k)} \quad (9)$$

The linear relationship is written as follows :

$$K(x_1, \dots, x_k) = \beta_0 + \beta_1 x_1 + \dots + \beta_k x_k \quad (10)$$

With the link function :

$$K(x_1, \dots, x_k) = \ln \left[\frac{p(x_1, \dots, x_k)}{1 - p(x_1, \dots, x_k)} \right] \quad (11)$$

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The model: $K(x_1, \dots, x_k) = \beta_0 + \beta_1 x_1 + \dots + \beta_k x_k$ is adjusted using the maximum likelihood method. To this end, we solve a system of $(k + 1)$ equations for the coefficients β_0 and $\beta_1, \dots, \beta_k$, which we obtain by setting the partial derivatives of the log likelihood function $\ell(\beta_0, \beta_1, \dots, \beta_k)$.

- Polytomous regression

If we assume that the ϵ_{jn} are independently and identically distributed (IID), an assumption that is equivalent to the assumption (IIA) of independence of irrelevant alternatives, and that the ϵ_{jn} follow a Gumbel⁴ distribution, we obtain the multinomial logit model.

$$P_n(i) = \frac{\exp(V_{in})}{\sum_{j \in C_n} \exp(V_{jn})} \quad (12)$$

If the utility function is linear on the parameters, the model is written as:

$$P_n(i) = \frac{\exp(\beta' X_{in})}{\sum_{j \in I} \exp(\beta' X_{jn})} \quad (13)$$

X_{in} : explanatory variables representing the characteristics of microentrepreneurs

β : parameters to be estimated

- Interpretation of coefficients (odds ratio)

Note that the coefficient $P/1-P$ is called the "odds."

Consider a model with a dichotomous qualitative explanatory variable x representing the satisfaction of a microentrepreneur's needs, such as whether they satisfy their needs ($x=1$) or not ($x=0$).

The odds ratio (OR) associated with the variable satisfaction of needs is defined as follows:

$$\frac{\frac{P1}{1-P1}}{\frac{P0}{1-P0}}$$

Where $P1$ represents the probability of an individual having satisfied their needs and $P0$ represents the probability of not having satisfied their needs. The odds ratio is also called the "odds ratio."

An odds ratio equal to 1 means that the probability of satisfying the needs of a microentrepreneur is the same in both groups.

On the other hand, an odds ratio other than 1 means that there is an association between the two groups.

If this odds ratio is >1 , it means that the numerator is greater than the denominator and, therefore, microentrepreneurs with a given characteristic are more likely to have their needs met compared to those without it, and vice versa.

II.4. Model specification

The model specification depends on the nature of the endogenous variables. The dependent variable is poverty reduction through SMEs. Four proxies capture poverty reduction, namely whether or not educational, water supply, and sanitation infrastructure is built, and whether or not jobs are created.

As our dependent variables are dichotomous, we are forced to choose an appropriate analysis model. In this context, Hurlin (2003) points out that dichotomous Logit and Probit models use as the explained variable not a quantitative value associated with the occurrence of an event, as in the case of linear models, but the probability of that event occurring, conditional on the explanatory variables.

Thus, we consider the following model:

Where the function $F(X_i\beta)$ denotes a distribution function, β is a vector of parameters to be determined associated with the vector X_i . The latter denotes a vector of explanatory variables related to the characteristics of SME owners and the resources generated by SMEs, which are likely to influence whether or not infrastructure is built and thus reduce poverty.

⁴ In probability theory, the Gumbel distribution, named after Emil Julius Gumbel, is a continuous probability distribution. The Gumbel distribution is a special case of the generalized extremum distribution, as are the Weibull distribution and the Fréchet distribution. The Gumbel distribution is a satisfactory approximation of the maximum distribution of a sample of independent random variables all following the same distribution, provided that this distribution belongs precisely to the attraction domain of the Gumbel distribution. Among the distributions belonging to the attraction domain of the Gumbel distribution is the exponential distribution.

III. RESULTS AND INTERPRETATIONS

III.1. Results of estimates for basic social services and job creation

The following table presents the results of the estimates. Model 1 presents the results of the estimate for the construction of educational infrastructure. Model 2 presents the results of the estimate for the construction of health infrastructure. Model 3 highlights the results of the estimate for water supply infrastructure, and Model 4 presents the results of the estimate for job creation.

Table 2: Odds ratio and probabilities

Variables	Model 1 Educational infrastructure		Model 2 Health infrastructure		Model 3 Water supply infrastructure		Model 4 Job creation	
	Odds ratio	Pr	Odds ratio	Pr	Odds ratio	Pr	Odds ratio	Pr
Male	.350957	0.182	.3835722	0.276	1.488002	0.747	.3584104	0.137
Higher	5.921206	0.005	.9609454	0.957	.2115247	0.188	2.580388	0.089
Married	1.384445	0.593	.3128691	0.197	1.707729	0.569	.5865509	0.341
Own resources	.2612097	0.034	.9377473	0.932	-	-	.7254284	0.553
Turnover	.9999999	0.167	1	0.369	1	0.834	1	0.495
Satisfaction	.2085267	0.027	.1467038	0.055	.2080317	0.169	.1035154	0.002
Age over 50	2.069762	0.241	.5417031	0.487	.3069648	0.323	.5373869	0.286
Const	4.505874	0.230	4.416615	0.392	.6475873	0.813	14.98497	0.039

Source: Author using Stata

III.2. Discussion of estimation results

- Discussion of the results of the estimation of whether or not to build educational infrastructure

Overall, the results of the logistic regression of the estimation of whether or not to build educational infrastructure show that level of education, economic resources, and satisfaction significantly influence the probability of having educational infrastructure. These relationships shed light on the role that educational infrastructure plays in poverty reduction.

Economically, the presence of educational infrastructure in a locality acts as a lever for human development. It improves the human capital of the surrounding populations by facilitating access to training, literacy, and professional qualifications. In the long term, these effects translate into increased productivity, better employability, and more stable incomes, thereby reducing monetary and non-monetary poverty.

Indeed, the results show that SMEs whose owners have a higher level of education have educational infrastructure. This shows that educated individuals perceive the importance of training and are more involved in the establishment of local educational structures. In return, these infrastructures benefit less educated populations, contributing to raising skill levels and incomes, which can reduce poverty.

Conversely, SMEs that finance themselves with their own resources are less likely to have educational infrastructure compared to SMEs that finance themselves through loans and donations. SMEs that finance themselves from their own resources are often more cautious and financially limited. They prefer to focus their resources on activities with direct returns rather than on educational infrastructure, which has indirect and long-term returns. On the other hand, financing through loans or donations allows SMEs to mobilize significant resources without directly affecting their cash flow. This type of financing gives them more leeway to finance projects with positive social externalities, such as the construction of educational infrastructure. It should be noted that institutions that grant loans or donations often impose social conditions, taking into account social responsibility, community impact, and educational inclusion.

SMEs whose owners are satisfied with their business are less likely to build an educational infrastructure than SMEs whose owners are dissatisfied with their business. Before interpreting these results, it is important to distinguish between satisfaction and financial resources. The fact that an SME owner is satisfied with their business does not necessarily mean that their company generates sufficient financial surpluses to finance the development of an educational infrastructure. Satisfaction may stem from the stability of the business, the level of staff income, or the control the owner exercises over their business. On the other hand,

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profit margins or cash flow may remain limited. The satisfaction of an SME owner does not necessarily equate to the ability to invest in infrastructure.

Similarly, even if an SME is profitable, the owner may choose to reinvest in other areas, such as purchasing new equipment, expanding production, or diversifying products. In this context, the owner of an SME does not consider it a priority to finance educational infrastructure, which is perceived as a social investment that is not productive in the short term.

- Discussion of the results of the estimation of whether or not to build a sanitation facility

The satisfaction variable is significant at the 10% threshold and has a negative effect. This means that SMEs whose owners are satisfied with their business are less likely to build a sanitation facility than SMEs whose owners are dissatisfied with their business. It is important to distinguish between satisfaction and financial resources. The fact that an SME owner is satisfied with their business does not necessarily mean that their company generates sufficient financial surpluses to finance the construction of sanitation infrastructure. Satisfaction may stem from the stability of the business, the level of staff income, or the control that the owner exercises over their business. On the other hand, profit margins or cash flow may remain limited.

- Discussion of the results of the estimation of whether or not to build a water supply infrastructure

As the model is not statistically significant overall, none of the variables are either, since all Student's t-test values are greater than 10%.

- Discussion of the results of the estimation of job creation

The estimation results show that two variables are significant. The level of education above the 1% threshold and overall satisfaction with the business are significant at the 5% threshold.

SMEs whose owners have a higher level of education are more likely to contribute to job creation than SMEs whose owners do not have a higher level of education. This can be explained, on the one hand, by the fact that a high level of education among SME owners enables entrepreneurs to design more structured and scalable business models that are capable of moving beyond the stage of self-employment or micro-activity. This structuring promotes an increase in production and sales volume, which generates additional demand for labor to support the expansion of the business. On the other hand, more educated entrepreneurs have a better command of human resource management, which reduces aversion to hiring. They are able to anticipate labor needs, define clear job roles, and gradually integrate new workers, making job creation more planned and sustainable.

The satisfaction variable is significant at the 5% threshold and has a negative effect. This means that SMEs whose owners are satisfied with their business are less likely to create jobs than SMEs whose owners are dissatisfied with their business. This result reveals a paradox, in that SME owners who are satisfied with their business are unable to create jobs. However, several economic, structural, and psychological reasons could explain the opposite.

Indeed, the owner may be satisfied because their small-scale business is doing well. This owner will prioritize income stability and risk control over expansion. Creating jobs would involve new responsibilities and high fixed costs.

Satisfied with being satisfied, micro-entrepreneurs may not have sufficient capital to hire. It is increasingly difficult for micro-entrepreneurs who do not offer collateral to obtain credit from institutions.

Furthermore, the cost of an employee in terms of taxes and social security contributions can discourage small businesses from recruiting, even if business is good. In this context, entrepreneurs prefer to employ assistants or family members.

CONCLUSION

The results showed that SMEs have an impact on poverty reduction through transmission channels such as the construction of educational, health, and water supply infrastructure, as well as through job creation.

The results of the logistic regression show that SMEs whose owners have a higher level of education have a positive effect on poverty reduction through the channel of educational infrastructure construction, compared to those who do not have a higher level of education.

On the other hand, SMEs whose owners are satisfied with their business and SMEs that are financed with their own funds are less likely to reduce poverty, compared to SMEs whose owners are not satisfied with their business and SMEs that are not financed with their own funds, respectively.

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