

Article

Spatio-temporal analysis of micro financing for agricultural innovation diffusion in Mezam division, Cameroon

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Some rural development experts consider micro-financing as a panacea for food insecurity and rural poverty alleviation. Development policies in favour of the rural poor using micro-financing have had positive but insufficient impacts on the conditions of poverty. The study uses a combination of primary and secondary data to make a spatio-temporal analysis of micro financing based on the innovation diffusion model. It appraises the techniques of micro credit diffusion, maps the spatial diffusion trends and analyses the evolution of the adoption process. The study like previous ones concludes that the micro credit scheme has had positive but insufficient impacts on agricultural development. It therefore identifies the bottlenecks in the use of micro financing in favour of the rural poor and the scope to achieve a successful design of a community-based financial institution which is best adapted to rural realities and will be accepted by local financial institutions and by the rural people alike. Micro financing should aim at making available financial and technical assistance to the poor by adapting to local realities, linking structures with the informal financial sector of the micro economy and innovating institutions and procedures for access to credit.

Key words: Spatial diffusion, temporal diffusion, micro-finance, core-periphery, innovation adoption, agricultural development.

INTRODUCTION

For some rural development experts, the use of micro credits as a panacea for poverty alleviation in developing countries is highly questionable (Ndenecho, 2004; Akum, 2006; Adams, 1988; Adams and Von Pischke, 1984; Vijay, 1999). At a first glance, many might be tempted to say that the poor in developing countries are neither credit worthy nor able to save. Recent socio economic research has shown that these common assumptions are unfounded (Zeller and Schieder, 1997). Yet, much of rural financial policy until the 1990s was based on this faulty premise (Vijay 1999; Zeller, 1999). This frequently leads to inefficient and detrimental policies that favour the establishment of rural financial markets in developing countries. Past policy neglected savings and insurance

services and emphasized loans. Moreover, the concept of lending is often mixed up with that of providing relief and assistance (Hulme and Mosley, 1996). Most of the so-called credit projects quickly degenerated into transitory income transfer programmes with doubtful coverage of the rural poor, but with a never-ending need for injecting public resources to keep state-driven top-down rural banks and cooperatives from collapsing (Adams, 1988). One of such credit schemes in Cameroon is FIMAC (Investment Fund for Agricultural and Communal Micro Projects) (Ndenecho and Gemandze, 2000).

The study focuses on the first phase of the FIMAC loan project (1993 - 1998). It appraises the techniques of micro-credit diffusion and analyses the spatio-temporal pattern of the diffusion of FIMAC 1 loan scheme. It further identifies the scope for the provision of appropriate and sustainable financial services to the rural poor.

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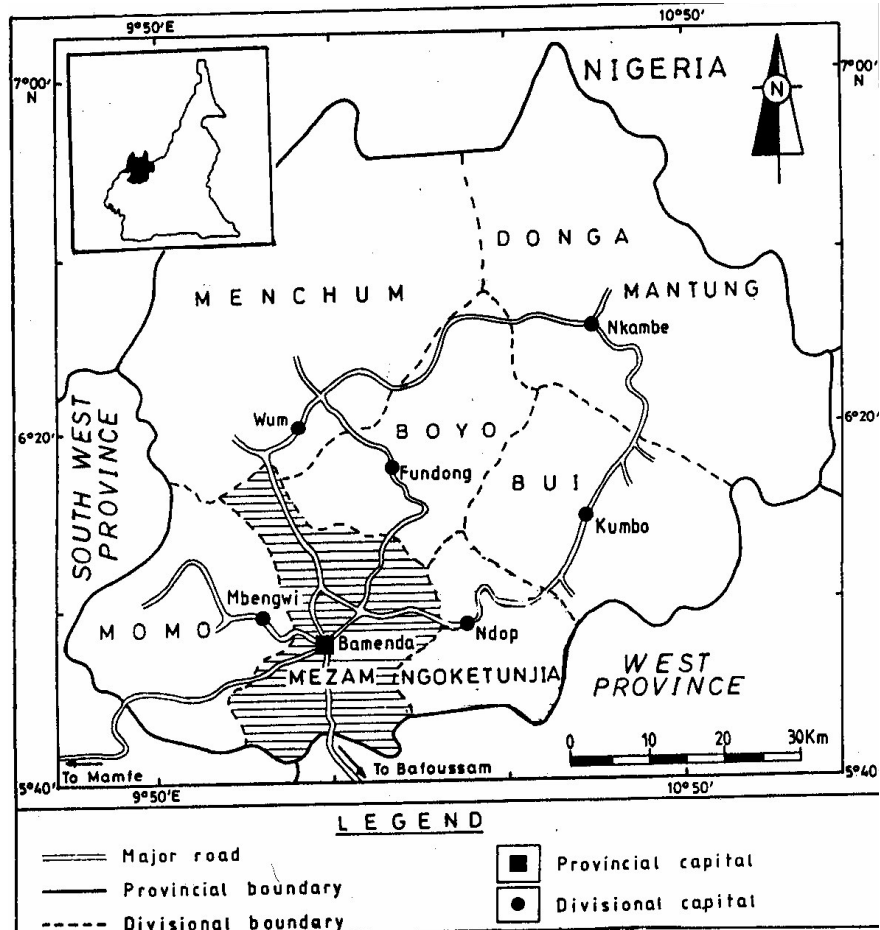


Figure 1. Location of the Study area: Mezam Division, North West Province of Cameroon.

STUDY AREA AND PROBLEM BACKGROUND

Location of the study area

Mezam is one of the seven administrative divisions of the North West Province of Cameroon (Figure 1). It is located between latitudes 5°20' and 6°15'N and longitudes 09°7' and 10°21'E with an approximate land surface area of 1,841,000 km². Five sub-divisions make up Mezam. These include Bamenda Central, Bafut, Bali, Santa and Tubah. The relief is a plateau with altitudes between 1000 and 2500 m and characterized by mountain ranges, intermontane plains, plateaux, deep valleys, escarpments and cascading upland streams.

The area has a tropical montane climate characterized by cold, cloudy and misty weather in areas with elevations above 1800 m and a hot and humid weather in areas with elevations below 1800 m. The escarpment zones in the Akum-Bamenda-Sabga area present variable weather conditions (Hawkins and Brunt, 1965; Ndeh, 2000). The effects of altitude on weather conditions, that is, rainfall and temperature are important. The rainy season runs from mid-March to mid-November. The rest of

the year is a dry season. Average annual rainfall is 2288 mm. Orographic influences on rainfall volume are strong. Higher elevations receive higher rainfall. The average annual temperature is 19.7°C. Temperature also varies with altitude.

At higher elevations of the lava plateau in Santa, Mendankwe and Sabga areas are humic ferrallitic soils developed on basalts and trachytes. The rest of the area has poor ferrallitic soils developed on granites. Mezam presents a domesticated landscape characterized by a mosaic of cultivated fields, fallows, woodlots, compound farms, natural pastures in wooded savannas, gallery forests and raphia palm groves in valleys.

Problem background

The ecological circumstances of the area present several agro-ecological niches, which offer opportunities for the rearing of cattle, sheep, goats and poultry, the cultivation of tropical crops (bananas, plantains, coffee, cocoyams and yams) and the cultivation of temperate crops in afro-alpine zones (tomatoes, Irish potatoes, and market gar-

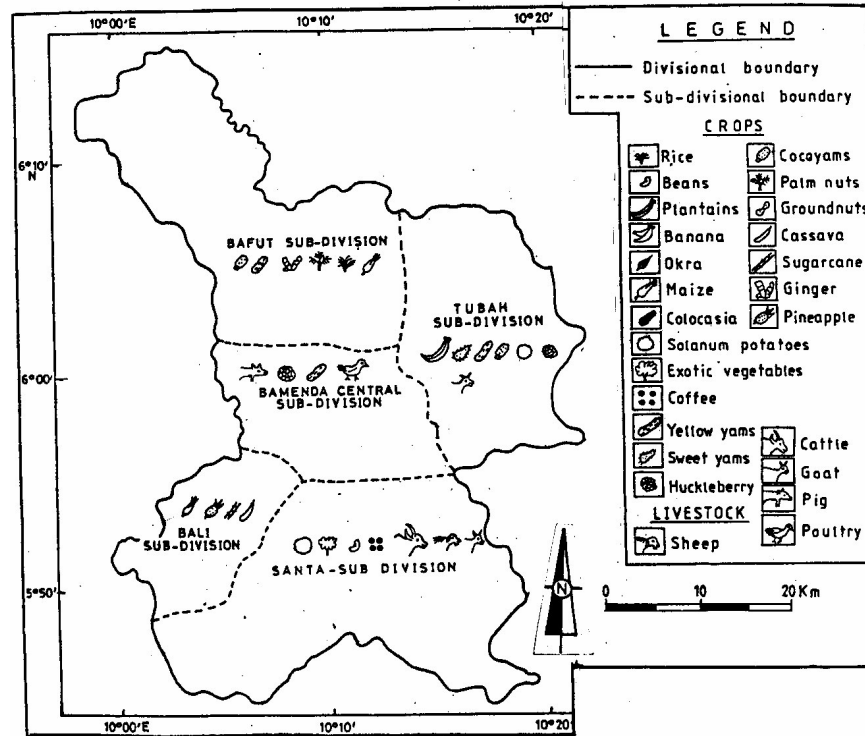


Figure 2. The distribution of main crops and livestock enterprise in Mezam Division.

Table 1. Demographic growth of Mezam.

Sub divisions	Estimated growth rate	2005	2015
Bamenda	7.83	427.147	907.766
Tubah	3.25	12.196	16.793
Bafut	3.80	24.527	35.613
Bali	2.91	34.008	45.306
Santa	3.95	6.105	8.994
Total	7.04	503.983	101.4472

Source: North West Provincial Service of Statistics.

dening). The main crops and animal husbandry enterprises are presented in Figure 2.

The demographic data presented in Table 1 indicates a very dynamic natural population growth. According to the 1987 national population census, Mezam had 313,086 inhabitants. Extrapolations at the growth rate of 7.04 per year placed the population at 503,983 in 2005. In 1987 the population density was 170 inhabitants/km². Today, it is in excess of 200 inhabitants/km². Bamenda town, with provincial headquarters in Bamenda central subdivision is sprawling into previously cultivated lands and its ribboning growth is likely to link it with Bafut, Bali, Santa and Tubah. Such growth is attributed to rural-urban exodus and the spread of rural poverty. These growing figures are an indication of pressure on natural and social resources and call for a need to promote sustainable rural

development.

Ajaga (2004) proposed a model of a vicious cycle of poverty in which peasant farmers constitute a group with limited resources for agricultural production; a group of which the annual revenue is equal to or slightly greater than subsistence needs and thus savings are almost zero. These groups of farmers live and survive in a vicious circle of poverty in which low production leads to low-income generation, which in turn implies low savings and investments, and eventually low production output because of the lack of capital. The government of Cameroon in order to enable sustainable rural development initiated a credit subsidy scheme known as the Investment Fund for Agricultural and Communal Micro-Projects (FIMAC). The FIMAC micro-credit scheme promotes the creation of common initiative groups (CIGs) as main cha-

nnels for agricultural innovation diffusion in Cameroon. FIMAC is a French abbreviation (Financements d'Investissement de Micro Realisation Agricoles et Communautaires). This government project was instituted by a World Bank loan in 1991 and implemented by the Ministry of Agriculture. The project seeks to improve the purchasing power of the rural population, create job opportunities by ensuring food security and increasing rural incomes. Micro projects financed include farm equipment and farm inputs. Aspiring farmers formulate common initiative groups (CIGs) with specific micro-projects. Loan application procedures and group qualifications are scrutinized by the FIMAC coordinating unit of the provincial delegation of AGRICULTURE. The FIMAC project has operated in two phases:

Phase 1 is referred to as FIMAC 1. It operated between 1991 and 1998. Interest free loans were granted to beneficiaries. Beneficiaries made available only 10% in kind and 10% in cash of the total cost of the micro project.

Phase 2 referred to as FIMAC 2 is described as second generation FIMAC loan scheme. It operated from 1998 to 2004. In this phase the credit unions managed all loans according to credit union laws, that is, a payment of 25% of the total cost of the project, an interest of 18% and the presentation of collateral security for the loan.

CONCEPTUAL FRAMEWORK AND METHODOLOGY

Conceptual framework

Changes in farming systems can be observed over time, that is, from purely subsistence to commercial systems. Such an evolution is the product of agricultural innovations, with the major objective of increasing output and subsequently income. Haggett (1983) developed the innovation diffusion model. The introduction of a new technique depends on information regarding the innovation, financial security, psychological make-up of the adopter and the physical proximity of the other adopters. Initially, very few people adopt an innovation. As information becomes more spread and often the cost is reduced, increasingly more people adopt it.

In terms of agricultural input procurement, urban centres are considered as the primary stage for innovations. This stage marks the beginning of the diffusion process. This is the innovative area or the core area in contrast to the surrounding rural area where the innovation has not yet been adopted. At the core there is maximum investment, that is, the core is a centre for credit necessary for agricultural development. The study seeks to investigate the adoption of the micro-credit scheme of FIMAC: the process of diffusion and the degree of receptivity in relationship to Hagggersstrand's innovation diffusion model.

Methodology and data sources

The study adopted a combination of primary and secondary data

acquisition techniques. A set of questionnaires was administered to agricultural institutions concerned with the promotion of agricultural innovations. A stratified random sampling technique was adopted to obtain information on the different agricultural innovations. Formal and informal interviews of the officials of these institutions yielded data on innovations, credit adoption and qualitative data on common initiatives (CIGs). Archival material of these institutions was also used. Reports of the FIMAC loan schemes (first and second generation loans) were obtained from the North West provincial coordinating unit of the FIMAC Project. The reports presented data on loan procurements, recovery rates and the CIGs linked to the scheme. These data were translated into maps and diagrams and tables; and constitute the basis for the establishment of the spatial pattern of innovation diffusion and the core-periphery relationship in agricultural micro-credit adoption. The data were also analyzed using simple descriptive statistics based on measures of means and percentages.

RESULTS AND DISCUSSIONS

Diffusion techniques

The project assumes that small farmers' need is mainly inadequate capital. The assumption is that the acquisition of credit will immediately transform small farm holdings into prosperous enterprises. Consequently FIMAC loans were granted CIGs that claimed to have a farming vocation, hence a recovery rate of 49.29% for Mezam. The project uses a top-down approach for the diffusion of the loan scheme. The approach includes the following diffusion tools:

Sensitization through the media: This involves the use of the local government radio station in Bamenda, newspaper columns and flyers. With a highly illiterate farmer population, lack of access to radio-diffused information in rural areas and access to newspapers, this tool has not been very effective.

Agricultural extension staff: Frontline agricultural extension workers in villages are used to disseminate information on the loan scheme, that is, the identification of CIGs, development of project proposals, implementation and supervision of micro-projects financed by FIMAC.

Common initiative group: A CIG is composed of at least 3 and at most 20 members. During the survey, that is (June 2006) there were 123 CIGs in Mezam that had benefited from the loan scheme. It was observed that some of these groups existed only on paper-having directed the loans to non-agricultural undertakings.

Service institutions: Loans are sub-leased through rural development agencies that collaborate with the FIMAC coordinating unit (Table 2).

From FIMAC reports, CIGs supervised by non-governmental organizations (NGOs) had a high loan recovery

Table 2. Service institutions and CIGs in the diffusion process of Micro Credits in Mezam Division.

Service Institutions	Number of CIGs	Percentage (%)
Ministry of Agriculture (MINAGRI)	48	39.03
Ministry of Livestock (MINEPIA)	12	9.76
Ministry of Women's Affairs (MINCOF)	08	6.50
Sustainable Livestock Foundation (SLF)	34	17.64
Heifer Project International (HPI)	01	0.81
World Food Programme (PAM)	15	12.20
North West Bee Farmers Association (NOWEBA)	04	3.25
PAFSAT	01	0.81
Total	123	100

Table 3. Number of credit unions and CIGs in the micro-credit diffusion process in Mezam Division.

Sub division	Credit unions		Common initiative groups	
	No.	%	No.	%
Bafut	1	7.0	10	7.86
Bali	1	7.0	05	3.47
Bamenda	6	38.0	49	48.96
Santa	4	25.0	37	25.17
Tubah	4	25.0	22	14.54
Total	16	100	123	100

Table 4. Spatial distribution of CIGs and total loan acquisition in Mezam (FIMAC 1).

Sub division	No. of CIG	% of total no. of CIGs	% of total loan	Total loan (FCFA)
Bamenda central	49	39.84	48.96	48471550
Bafut	10	8.13	7.86	7786400
Bali	5	4.07	3.47	3433000
Tubah	22	17.89	14.54	14394000
Santa	37	30.08	25.17	24923500
Total	123	100	100	99008450

Source: FIMAC report 2005.

rate of over 90%. On the other hand governmental organizations had a recovery rate of about 63%. This highlights the efficiency of NGOs in the loan diffusion process and the inefficiency of government institutions.

Credit unions: Loans are disbursed through credit unions and CIGs are expected to provide 10% in cash and 10% in kind of the amount of the project cost for FIMAC 1. For FIMAC 2, pay an interest rate of 18% and make available to the credit union 25% of the loan requested. Table 3 presents the credit unions in the loan diffusion process.

Spatial distribution of rural credit

Table 4 presents the spatial distribution of CIGs and total

loans disbursed by 2005. This data was mapped and presented in Figures 3 and 4. The study considered Bamenda as the core area from where the innovation starts. This is testified by the service institutions which are all based in Bamenda, 6 credits unions in the loan diffusion process and 49 CIGs, that is, 38% of the credit unions, 39.84% of the total number of CIGs and 48.96% of the total loans disbursed. This is the provincial headquarters and host to the provincial FIMAC programme (Figure 4).

Table 5 and Figure 5 focus on the core area. Within the core area peri-urban agriculture takes advantage of access to Bamenda city. A core-peripheral relationship with reduction in diffusion and adoption is also observed. The main villages of Nkwen, Mankon and Bamendankwe form the hub of Bamenda central sub-division. Here innovation covers over 95% of the total of 46 CIGs. It is noted that

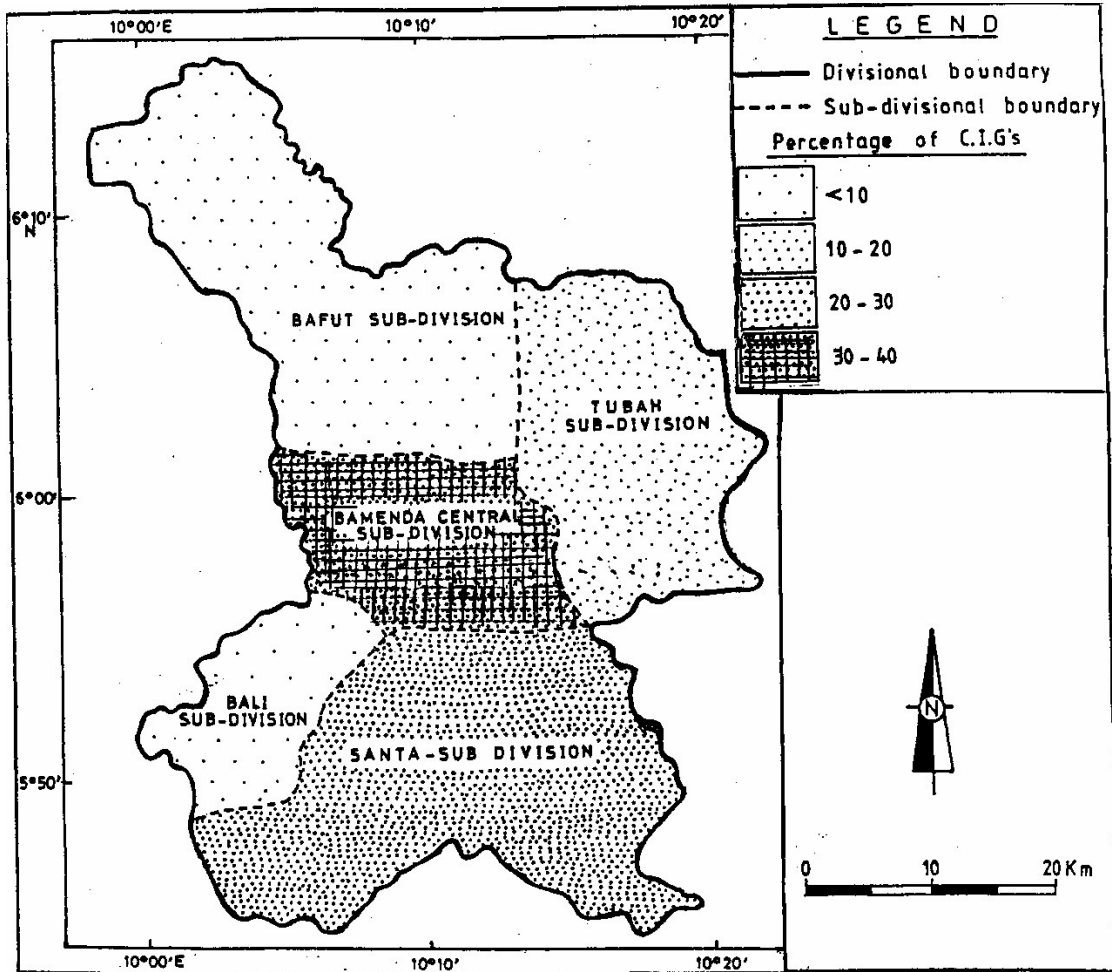


Figure 3. Spatial distribution of the diffusion of common initiative groups in Mezam.

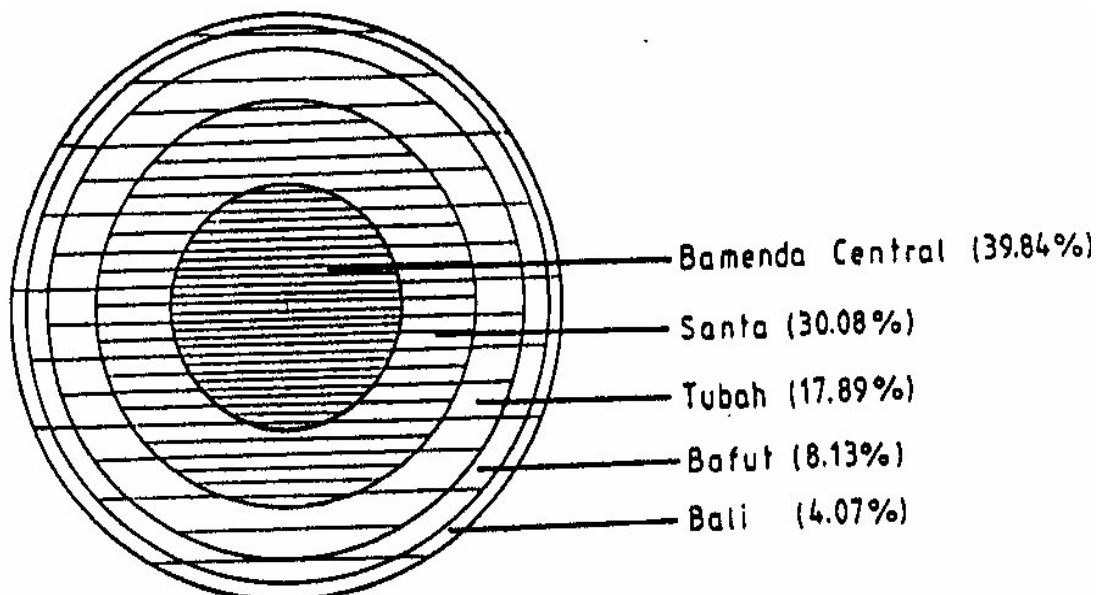
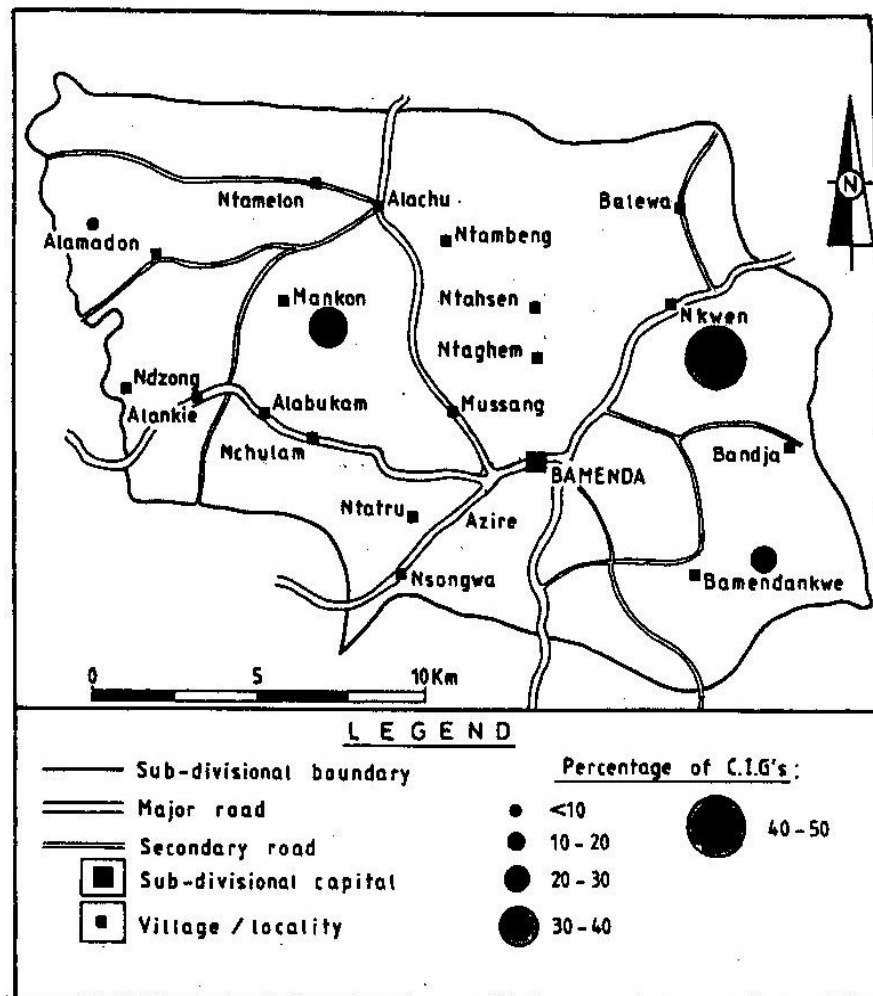


Figure 4. Core-periphery diffusion of common initiative groups in Mezam.

Table 5. Micro credit diffusion process in the core area: Bamenda central.

Village	No. of CIGs	% of total no. of CIGs	% of total loan	Actual amounts of loan
Alamandum	1	2.17	2.36	1000000
Baba II	1	2.17	2.24	950000
Mankon	14	30.43	31.71	13440350
Bamendankwe	10	21.74	19.11	8101180
Nkwen	20	43.48	44.58	18894020
Total	46	100	100	42385550

Source: FIMAC report 2005.

**Figure 5.** Spatial distribution of the diffusion, process of common initiative groups in Bamenda central sub - division: core area.

though Mankon is at the centre, it has 14 CIGs while Nkwen has 20. This can be explained by the fact that most of Mankon's accessible arable land has been taken up by urban activities while Nkwen still has plenty of arable farm land with a relatively larger rural population. Alamandum, far away from the centre, has only one CIG. This further illustrates the core-peripheral effect.

Annual evolution of rural credit adoption

Table 6 presents the evolution of the number of CIGs in Mezam during the first phase of the project. The FIMAC loan scheme is just one of the many micro-credit schemes in the area. In 1997 the provincial registrar of cooperatives/CIGs registered 534 CIGs in Mezam. Of this

Table 6. The evolution of the number of CIGs in Mezam during FIMAC 1.

Sub division	1993	1994	1995	1996	1997	1998
Bamenda central	9	16	15	6	5	1
Bafut	7	1	0	0	0	0
Bali	1	1	3	0	0	0
Tubah	1	4	11	5	2	0
Santa	5	8	9	9	4	0

Source: FIMAC report 2005.

Table 7. Adoption analysis of CIGs involved in FIMAC 1 Micro Credit Scheme in Mezam.

Sub – Division	Innovators	Early majority	Late majority	Laggards
Bamenda Central	9	16	21	6
Bafut	7	1	0	0
Bali	1	1	3	0
Tubah	1	4	16	2
Santa	5	8	18	4
Total	23	30	58	12
Percentage	19%	25%	48%	10%

number, 123 (23%) benefited from FIMAC 1 loans. The data presented in Table 6 shows a very low adoption rate in an area whose main economic activity is predominantly agricultural. The cooperative members account for only 27% of the farming population while the CIGs, less than 20%. Consequently, farmers' accessibility to rural credit is low (Ndenecho, 2004). Most farmers could not afford the prerequisite of 10% savings of the requested amount of loan. From Table 6, an adoption analysis of the micro-credit scheme was developed (Table 7).

Table 7 presents the evolution of adopters of the credit scheme between 1993 and 1998. Based on the analysis, the success of the innovation can be determined. The members of CIGs benefiting from the loan scheme account for less than 20% of the farming population of the area (Ndenecho, 2004). The majority of the farming population (approximately 80%) is ignorant of the innovation. Of the 123 CIGs (approximately 20% of the farming population) the analysis is as follows (Table 7):

Innovators: These are members of the farming population who know the innovation through conception, learning and practicing it. They constitute 19% of the CIGs (1993-1994).

The constrained individuals: This group is made of farmers who are aware of the innovation but are not immediately capable of implementing it for various reasons. In this group can be identified the early minority (25%), the late majority (48%) and the laggards (10%). They constitute 81% of the CIGs or 23 CIGs out of 123 CIGs.

For an innovation to be successful, each innovator must successfully convince or endow one ignorant or constrained individual to adopt the innovation. The success index is therefore the number of secondary innovators that shall be formed from one primary innovator. If this number is less than 1 the innovation fails and if it is bigger than 1, it succeeds, that is, $\text{Innovators} / \text{constrained individual} = 23/123 = 0.186$. Consequently, the innovation has failed. A number of reasons account for this:

- Most farmers could not afford the prerequisite of 10% savings
- The demand for evidence of viable productive assets as collateral security excluded many small farmers from participation.
- Small-scale farmers cannot afford the time-consuming exercise of bureaucratic procedures in credit application and transactions.

Azire, Credit Union Limited, the largest credit union in the province registered a delinquency rate for the year 1999/2000 as high as 37%. Micro credit has the following limitations:

- The rural poor who are small-scale farmers do not necessarily desire to be entrepreneurs as assumed.
- Micro credit policy considers credit as the most vital financial service for the poor. This may not be true.
- There is the assumption that credit can immediately be transformed into a prosperous micro enterprise.
- Rural people a little above the poverty line do not de-

desire micro credit, but once accorded them these credits are used for other purposes.

Many experts working in the region conclude that by 1999/2000 rural credits had little or no positive impact on technology adoption by farmers. A number of constraints account for this: the low prices of coffee on the world market; low market prices for vegetables and small livestock; the non-availability of technological innovations due to the Ministry of Agriculture's weak extension service; bottlenecks in fertilizer procurement and marketing system; and the fact that small farmers are nonchalant over information related to rural credit.

CONCLUSION

The development of a rural finance system for the poor incurs considerable investment costs that neither the client nor the rural financial institutions involved are willing or able to fully cover in the short-run. Moreover, most developing countries are yet to achieve a successful design of a community-based financial institution which is best adapted to rural realities and that will be acceptable by local financial institutions and by the rural people alike. Cameroon has witnessed the failure of several micro credit schemes since the 1970s. This phase of institutional experimentation necessitates public action that precedes the take-up of eventual prototypes by the private sector. The MC² Bank (Mutuelle Communautaire de Croissance) is such an example. In order to provide appropriate and sustainable financial services to rural people this private financial house (Bomda, 1999):

- Adapted its structures to the micro economy and the socio-cultural environment of the rural people: downgrading.
- Linked its structures with the informal financial institutions of rural people: linking.
- Created new institutions and developed adequate procedures and innovative products: innovating.

These institutional innovations in rural finance can enhance outreach to the poor. Micro credit schemes may best be appropriate for small and medium size entrepreneurs. Micro financing should aim at making available financial and technical assistance to the poor by adapting to local realities, linking structures with the informal financial sector of the micro-economy and creating new institutions and procedures that enhance access to credit.

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