Combining Qualitative and Quantitative Methods in Assessing the Impact of Agro-pastoral Projects on the Productivity of Farmers Organisations: The Case of Cameroon

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Abstract

Between 2001 and 2007 the poverty headcount in Cameroun has remained steady around 40%. In fact, poverty has reduced in urban areas while it has increased of about 3 points in rural areas. This, despite the numerous agro-pastoral projects that were undertook by the government between 2002 and 2008 in favour of rural people. The aim of this study is to assess the impact of these actions on the productivity of famers' organisations.

The methodology is based on an integrated assessment approach combining both qualitative and quantitative aspects. The qualitative analysis uses Likert scale. The quantitative approach is based on Rubin's causal model and uses propensity score matching techniques. The main data used are those of the survey on the assessment of the impact of projects (EIPA) conducted by Ministry of Economy and Planning in 2009.

The results obtained with both methods (qualitative and quantitative) are consistent and indicate that projects implemented by Cameroun government and donors between 2002 and 2008 have had a positive impact on the productivity of farmers' organizations. The analysis of satisfaction, while indicating an overall appreciation of projects by leaders and members of FOs, shows that the level of satisfaction seems to be negatively correlated with the regional level of poverty. The matching techniques revealed that farmers' organisations aid recipients have experienced a 4% increase in their productivity. More specifically, the study reveals that the impact of government programs is more important in the breeding sector (16%) and in the agriculture sector, it is quite null. Furthermore, non-beneficiaries organisations of the breeding sector could have had an increase of their productivity of about 10% if they had benefited from government assistance.

The study therefore encourages rural people to regroup into organizations in order to be more efficient. The management of agro-pastoral projects should be more transparent in order to increase their impact on the productivity of famers' organisations and on poverty alleviation.

Keywords: Famers organisations, Agro-pastoral projects, Productivity, Poverty, Cameroon.

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1. INTRODUCTION

By ratifying the Millennium Development Goals (MDGs) in 2000, the Heads of States and Governments of developing countries decided to make the fight against extreme poverty and hunger one major concern for development policy in the medium and long term. It was therefore question, as well as ensuring macroeconomic stability, to halve, between 1990 and 2015, the proportion of the population living below the poverty line. In this context, several countries have adopted strategies to reduce poverty. The key idea of these strategies was targeting the poor and vulnerable to allocate more resource towards them (Lavallée *et al*., 2009).

In Cameroon, this international commitment has resulted in the implementation of the Poverty Reduction Strategy Paper (PRSP) between 2003 and 2008. But the results of this policy remained mixed. Indeed, according to the third Cameroon Household Survey (ECAM3), the poverty rate stabilized at around 40% between 2001 and 2007.Thus, the renewed growth since 1996 and redistribution mechanisms that have been implemented have not proved optimal for boosting economic development and social progress of all Cameroonians. This stability of the poverty headcount at the national level hides differences regardless to the area of residence. Indeed, rural areas are still plagued by growing impoverishment of its population. According to ECAM3, the poverty rate rose from 52% to 55% in rural areas between 2001 and 2007; whereas it has fall of about six points in urban areas.

To make growth be pro-poor, several initiatives were implemented towards the rural area. Thus, from 2002 to 2008, rural communities have benefited of about 33 programmes/projects to support local initiatives in order to boost agricultural development. Specifically, it came to improving the access of farmers to modern farming techniques and high efficiency through the establishment of regional distribution of fertilizer, farm machinery, improved seed and regeneration of areas for erosion control in some areas. There was also support for breeders of cattle, ruminants, pigs and poultry. In addition, efforts have been made in the domestication of wild species in the fight against poaching. With regard to community development, many development plans have been developed and funding was granted to community micro projects through programs and projects such as PNDP, PADC, PCRD and FIMAC[4].

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[4] PNDP : Programme National de Développement Participatif. PADC : Programme d'appui au Développement Communautaire. PCRD : Projet de Crédit Rural Décentralisé. FIMAC : Fonds d'investissement de Matériel Agricole au Cameroun.

The country has adopted in 2009 the Growth and Employment Strategy Paper (GESP) is the new framework of government policy until 2020. The development of agro-products is listed as one of the major objectives to support vigorous growth of the economy in the medium term and achieve the status of emerging market long term. Thus, the impact assessment of development projects in rural areas that the state began implementation between 2002 and 2008 is therefore of paramount importance in order to draw lessons and identify avenues for the implement the new guidelines. In addition, this evaluation is part of the modernization of methods of public management, which requires to various administrative structures the need to engage, perform, realize, learn and adapt to social changes.

This study aims to deepen and complement the analysis made by the Ministry of Economy and Planning (MINEPAT). It is principally based on the survey EIPA. Its overall objective is to assess the impact of agro-pastoral projects and programs undertaken by the State and development partners between 2002 and 2008 on economic development of rural areas. Specifically, it first present the evolution of poverty in rural areas in Cameroon between 2001 and 2008, assess the state of satisfaction of people who have received support and assess their impact on the productivity levels of farmers' organizations (FOs). These are associations created and managed by farmers themselves to defend their common interests. In principle, their activities take place without state intervention. Their total number in Cameroun was estimated at about 90 000 in 2009.

The rest of the document is divided into six sections. The following section describes the rural area and presents the projects that were implemented. Section 3 is about a brief literature review on impact evaluation approaches; section 4 presents the methodology of the study. Section 5 describes the data used. Section 6 presents the results; it leads to section 7 which concludes the document.

2 - DESCRIPTION OF THE RURAL AREA AND PRESENTATION AND PROJECTS AGRO-PASTORAL IMPLEMENTED BETWEEN 2002 AND 2008

2.1 Evolution of poverty between 2001 and 2007 in rural areas

According to ECAM3data, the population of Cameroon was estimated at 17.9 million people in 2005 with 11.6 million (64.7%) living in rural areas. The national poverty headcount was estimated at 40%. But this national average masks huge disparities according to place of residence and region. Indeed, one can note that 55% of people living in rural areas are poor while only 12% of the urban population is affected by poverty. In addition, between 2001 and

2007 the gap in living standards between urban and rural areas has increased: poverty has reduced by about 4.7 points in urban areas while it has increased of 3 points in rural areas.

At the regional level, we see that poverty in rural areas is unevenly distributed between the different regions. Nearly a third of the rural poor live in the Far North region (32.2%), followed by North (16.2%) and Northwest (13.5%). The Littoral and South each have less than 3% of rural poor. Between 2001 and 2007, poverty rate has increased in four regions namely: the Far-nord (13.6 points), the Nord (18.3 points), Adamaoua (10.2 points) and the East (+8.3 points).

Furthermore according to the Socio Economic Group of the head of the household, ECAM3 report (2010) indicates that people living in households where the head exercises in the agricultural sector (agriculture, fishery, hunting, etc..) are the most affected by poverty. These people live mostly in rural areas. They have not benefited sufficiently from economic growth and have been more than others, affected by the rising prices of essential commodities. Thus, the rate of poverty in these households has increased by 3 points between 2001 and 2007 reaching 60%. In contrary, the incidence of poverty has dropped by at least 6 points for the other categories of households.

Table 1: Indicators of monetary poverty in the rural area

Regions	Structure pf rural population (%)		Number of poors in the rural area		Poverty incidence in rural area(%)		Difference		Distribution of poors in the rural area	
	2001	2007	2001	2007	2001	2007			2001	2007
Adamaoua	4,7	6,2	250 665	454 400	52,5	62,7	↗	10,2	4,8	7,1
Centre	11,0	10,6	571 221	531 200	51,4	43,0	↘	-8,4	10,9	8,3
East	6,5	6,2	313 595	403 200	48,0	56,3	↗	8,3	6,0	6,3
Far-Nord	24,2	24,4	1 442 095	2 060 800	59,0	72,6	↗	13,6	27,4	32,2
Littoral	4,3	3,0	206 254	108 800	47,8	30,7	↘	-17,1	3,9	1,7
Nord	8,6	12,1	480 516	1 036 800	55,3	73,6	↗	18,3	9,1	16,2
Nord-west	14,1	12,8	872 941	864 000	61,2	58,0	↘	-3,2	16,6	13,5
West	13,7	11,1	605 031	422 400	43,8	32,8	↘	-11,0	11,5	6,6
South	4,7	4,7	154 282	166 400	32,5	30,4	↘	-2,1	2,9	2,6
South-west	8,2	9,0	358 043	352 000	43,5	33,7	↘	-9,8	6,8	5,5
Total rural	65,2	64,7	5 254 644	6 400 000	52,1	55,0	↗	2,9	84,5	89,2
Urban*	34,8	35,3	962 415	700 000	17,9	12,2	↘	-4,7	15,5	10,8
National	**100**	**100**	**6 217 059**	**7 100 000**	**40,2**	**39,9**	↘	**2,9**	**100**	**100,0**

2.2 Presentation of the some characteristics of the agricultural sector

The main activities are agricultural crop production food (maize, millet, sorghum, cassava, potatoes, yams, plantain, vegetables, citrus fruits, etc.), cash crops production (cocoa, coffee, rubber, banana, etc.), (breeding (sheep, goats, poultry, etc.) fishery and traditional hunting. The survey on employment and the informal sector carried out in Cameroon in 2005 shows that this sector is the largest donor of employment. At the national level, it has 55.2% of the workforce which is predominantly composed of women (53%). In the rural area, it is 73% of workers who go there. The agricultural sector accounts for about 27% of Cameroon gross domestic product.

Agricultural workers are relatively young compared to those working in the formal sectors. Indeed, the average age is 33.5 years against 36 years in formal private sector and 39.6 years in the public sector. Regarding the level of instruction, we can note that agricultural workers are less educated than workers of other sectors. They have, in average, completed only 3.2 years of study. These workers have the lowest wages, more than half of them earn less than 4200 CFAF (9 USD) per month and the average income is 11 100 CFAF (25 USD). In contrast, the average income in the public sector is 125 600 CFAF (280 USD) per month.

Table 2: Some descriptive statistics of the labour market.

	Distribution of workers (%)	Average age	Proportion of women (%)	Years of study completed	Average income
Urban					
Public	10.5	39.7	31.8	12.3	146,2
Formal private	11.8	36.1	20.4	10.9	122,6
Informal non agricultural	67.4	31.2	45.4	7.0	33,0
Agriculture	10.3	37.2	57.4	5.2	16,3
Together	**100**	**33.3**	**42.2**	**7.8**	**53,6**
Rural					
Public	2.6	39.4	25.8	11.3	91,0
Formal private	2.0	35.9	15.4	7.6	55,3
Informal non agricultural	22.5	31.9	55.0	4.3	19,7
Agriculture	72.9	33.3	52.7	3.2	10,7
Together	**100**	**33.2**	**51.8**	**3.8**	**15,7**
Cameroon					
Public	4.9	39.6	29.5	11.9	124,6
Formal private	4.7	36.0	18.9	9.9	102,6
Informal non agricultural	35.2	31.5	49.8	5.8	26,9
Agriculture	55.2	33.5	53.0	3.4	11,0
Together	**100**	**33.2**	**49.1**	**4.9**	**26,4**

2.3 Presentation of agro-pastoral projects implemented in the rural area between 2002 and 2008

As noted in the GESP, a strong and sustainable growth necessarily involves the emergence of the agriculture sector. However, this sector which is characterized by the predominance of small farms with low productivity informal fails to meet the major challenges it faces: (i) contribute to the fight against poverty, (ii) ensure food security, (iii) the successful integration in trade and, (iv) ensure sustainability of agriculture performances.

In order to boost the agricultural sector, the Cameroonian government, with the support of development partners has undertaken some major projects. These state interventions include multiple domains and are based on thirteen (13) axis:

Axis 1: Extension of the regulations. This is sensitization on the opening of the hunting season, environmental education, training on safety, training on standards of agricultural and food products required in national, sub-regional and international markets.

Axis 2: Financial and material assistance. The financial grant is for the establishment of young farmers and ranchers and the supply of equipments to producer organizations. It is also the distribution of transformation tools to producer organizations in order to boost and local processing or production.

Axis 3: The development of agricultural training. In this line it comes to the creation of institutions to meet the needs of farmers in training. It is also about strengthen the capacity of existing institutions.

Axis 4: Developing community infrastructure. This axis concerns mainly the construction and maintenance of infrastructure to improve access to production areas, forest management and development of marketing infrastructures.

Axis 5: Promoting the participatory approach. It is about strengthening the involvement of beneficiaries in the economic and social development. Specifically, it is the promotion of farmers' organizations.

Axis 6: Restoring production potential. It is about the restoration of production potential and genetic resources for sustainable development.

Axis 7: Dissemination of technical and technological innovations. In this axis supports are oriented towards the dissemination of technical and technological innovations to improve the yields of farmers.

Axis 8: Promotion of appropriate and streamlined funding mechanisms. It is about facilitating access to credit to FOs.

Axis 9: Strengthening research- development activities

Axis 10: Phytosanitary protection and the fight against animal diseases. The major points of this axis are promoting the use of pesticides and the extension of techniques to fight against animal diseases.

Axis 11: Promotion of national and international markets. It is a matter of promoting national and international markets for agro-pastoral and forestry products.

Axis 12: Improving the legal and regulatory framework. It is a about implementing regulatory measures to facilitate, encourage and promote agricultural activities. The regulation also concerns the control of trade with the rest of the world in relation to population growth.

Axe 13: Institutional development and partnerships. This is the renovation and modernization of public service to enable the Government to exercise its sovereign functions. The promotion of private institutions and associations to ensure a better functioning of markets.

3. LITERATURE REVIEW ON IMPACT EVALUATION

3.1 Fundamentals of impact assessment

Assessing the impact of a project, in the microeconomic sense, is to ask the question: how the situation of those who benefitted the project is different, on average, of what it would have been if they had not benefitted of these project? It is therefore about estimating the causal effect of a treatment on a potential output. The notion of causality can be approach in two ways: deterministic and probabilistic.

The causal deterministic relation refers to a situation where the issue involves the effect and vice versa. If the effect is observed, the cause is present at the start. Several models have been advanced to explain the notion of causality. The Deductive model of Hempel (1942) postulates that "A causes B if the state of the system before A is different from the system state after A, so that B is the difference of these states. This approach has guided for a long time impact assessment.

The probabilistic model of Heidelberger (1992) defines causality as follows: an event A causes the event B if and only if the probability of occurrence of A increases the probability of occurrence of B. Formally, $P(B/A) > P(B/-A)$. The idea of Heidelberger is very

interesting in the sense that it offers an operational framework to the counterfactual model of David Lewis (1986). Assessing the impact of a project using Heidelberger's model is about calculating conditional probabilities.

An impact assessment should estimate counterfactual effects; this is to say what would happen to beneficiaries if the project had never existed. To do so, we must make a comparison between the control group (those who have not beneficiaries of the project) with the treated group (those who have benefited from the project). The literature identifies three approaches for impact assessment: the quantitative approach, the qualitative approach and the integrated approach (qualitative and quantitative).

3.2. The quantitative approach

With the quantitative approach, they are two ways to estimate the causal effect: the experimental or verification methods and the random non-experimental or quasi-experimental methods.

The experimental evaluation

The experimental evaluation was introduced by Cochran *et al* (1973), Rubin (1974) and is the most robust impact assessment approach (Baker, 2000). It suggests to randomly assigning individual who are interested into the project between the control group and the treated group (Brodaty, Crepon, Fougère, 2002). The idea is to construct two samples of individuals who are similar in every point but the only different from the fact that that one of the two groups is involved in the project and the other not. As mentioned by Atchade (2005), randomizing the only way to ensure that this happen.

This approach however raises a number of practical problems: first, the randomization can be enforced as a result of moral rejection of the beneficiaries or because of refusal of service to some eligible people (Baker, 2000). Second, it may be politically difficult to provide an intervention to a group rather than to another. Third, the scope of the project may be such that there is no control group (the case of nationwide programs that cover the entire population). Fourth, it can be difficult to ensure that the selection is truly random. And finally experimental designs can be costly and time consuming in certain situations, particularly if a new data collection has to be done (Baker, 2000).

The quasi-experimental method

This method (non-random) can be used to conduct an evaluation when it is not possible to constitute the treated and control groups by an experimental design. This technique generates a control groups that resemble the treatment group relatively to some observable characteristics. This method was introduced by Heckman and Hotz (1989) and extended by Heckman and Smith (1995). The quasi-experimental method is often more practical to adopt for evaluation. Indeed, it has the advantage that it can be implemented using existing data; it is faster and usually less time consuming. In addition, it can be executed after the project has been implemented if existing data are sufficient.

However, the method has some limits: (i) the reliability of result is often reduced because the methodology is less robust statistically; (ii) the statistics techniques used are often complex and, (iii) there is a problem of selection bias that cannot be completely reduced (Brodaty, 2002).

3.3 The qualitative approach of impact assessment

Quantitative techniques provide results in measuring the causal impact of projects or programs. However, they do not identify the mechanisms by which the impact is formed and how people feel the changes in their wellbeing. To overcome these drawbacks, the qualitative approach is used to assess the confidence that beneficiary group attach to the project (Mohr, 1995). Its use has grown in impact assessment in the 1990s.

In contrast causal inference methods, the underlying idea in the qualitative approach is to understand the perception of people, their behaviors and the conditions in which the project was implemented (Valadez and Bamberger, 1994). For example, qualitative methods, especially participant observation can help to understand the ways through which households and local communities perceive a project and how it affects them (Baker 2000).

The implementation of this method requires, among other, a data collection to identify beneficiary satisfaction. Qualitative data collected must be quantified to measure the changes brought by the project or programme (S. Garbarino and J. March, 2009). As in marketing, satisfaction is measured on the basis of a differential scale built using the techniques of Thurstone (1921), Thurstoneand Chave (1929) or Likert (1932). These techniques are powerful instruments of validity, but they do not isolate the factors underlying the attitudes measured (D. Szabo et al., 1968).

4. METHODOLOGY

The methodology of this study consists of an integrated approach combining quantitative and qualitative methods. The quantitative dimension is estimated using a causal model inspired by Rubin (1974) and the qualitative assessment is based on Likert's scale.

4.1 Impact of agro-pastoral projects: the quantitative approach

To drive an impact evaluation of a project, it is important to clearly identify the target variable. In this study, we assume that by subsidizing farmers' organizations (FOs), the goal of the Government is to increase the production per capita; so it is the target variable.

Let Y be this variable production per capita and T denote is the variable indicating whether the FO has benefited from a state assistance or not.

$$T = \begin{cases} 1 & \text{If the FO has benefited from subsidies (Treated)} \\ 0 & \text{Otherwise (Non treated)} \end{cases} \tag{1}$$

For an FO i then :
$$\begin{cases} Y_i = Y_i^T & if \ T_i = 1 \\ Y_i = Y_i^C & if \ T_i = 0 \end{cases} \tag{2}$$

Supposing that the production per capita is a linear in a set X of observable characteristic of the FO we have:

$$\begin{cases} Y_i^T = X_i \beta^T + \mu_i^T & if \ T_i = 1 \\ Y_i^C = X_i \beta^C + \mu_i^C & if \ T_i = 0 \end{cases} \tag{3}$$

The gain of the FO i in relation to the grant is $G_i \equiv Y_i^T - Y_i^C$. In the literature, G_i is also called the impact or the causal effect. The problem in computing G_i is that the potential results of treatment, Y_i^T and Y_i^C, are never observed simultaneously on the same date for the same individual.

This causal effect G_i is therefore unobservable, since only one of the two potential variables is observed for each individual; because of this there is a distribution of the causal effect in the population.

Three parameters are studied:

The average effect of subsidies on beneficiaries : $\Delta^{TT} \equiv E(Y^T - Y^C | T = 1)$

The average effect of subsidies on non beneficiaries: $\Delta^{TN} \equiv E(Y^T - Y^C | T = 1)$

The average treatment effect on Farmers organizations : $\Delta^{ATE} \equiv E(Y^T - Y^C)$.

<u>*Selection bias*</u>

In estimating the causal effect, there are two main types of bias. The first one is related to observable differences across the available data. For example, variables such as region, education level of the leader of the organization, the age of the FO, etc. The second type of bias is due to unobservable variables (or variables not available in the database). In fact, it is possible that factors like of the leader affect both the likelihood of befitting of Government assistance and the level of production of the FO.

These two sources of bias can seriously affect the results of the study. So, the challenge of non-experimental methods is to try to model the selection process in order to ensure the comparison between the treated and the control groups. Of these, matching methods appear to be the most used. However, matching can considered the bias related to observable characteristics which are available in the database.

Matching

In general it is a technique frequently used (Adangnikou, N. and Paul, J, 2004). Here, the control group is paired with the treated group on the basis of the predicted probability (propensity score) of receiving a grant. The first step is to model, using the variables available in the database, the process by which FOs receive support. In this study we have used the logit model to compute the propensity score. To pair FO we have implemented the Epanechnikov kernel matching which Heckman, Ichimura and Todd (1998) have shown its convergence (at a speed of $\sqrt{N}$) and its asymptotic normality under certain assumptions of regularity. This method consists to associate a beneficiary FO with a fictional non-beneficiary FO. the counterfactual is constructed using Mahalanobis distance and considering all the FOs that are in a bandwidth h.

Variables

The variables used for matching are:
1. Size of the FO: less than 10 members, 10 to 12 members, 13 to 20 members, 21 to 30 members and more than 30 members);
2. Agro ecological zone: forest, high mountains, and Sahel);
3. Age of FO ; less than 4 years, 5-7 years, more than 7 years);
4. Domain of activity: breeding, agriculture and others (hunting, fishery, ..);
5. Proportion of women (quantitative variable);
6. Proportion of youths (quantitative variable);

7- Sex of the leader (male and female);

8- Level of education of the leader (Never go to school, primary, secondary first cycle, secondary second cycle and higher secondary).

9- Age of the leader

4.2 The qualitative approach

For the qualitative approach we have analysed the level of satisfaction of the farmers' organisations at the level of leaders and members using Likert' scale. This method provides information on the intensity of agreement or disagreement= of respondents on each statement and it offers aggregation possibilities (Page-Bucci, 2003).

The principle of this likert scale is simple. We measure the satisfaction of the subject vis-à-vis the object from a series of items, and the sum of scores for each item give the satisfaction (or appreciation) score. The score can be described as "an intensity of satisfaction or dissatisfaction". This scale is additive.

We have apply Likert scale using section 2.3 of the questionnaire which is about indicating how state interventions have influenced activities and living conditions. The answers of each questions (item) have been recorded as follow: negative= -1; null=0 and positive=1. In total, we have considerer 11 items (*see appendix*).

The total score of a person *i* (leader or member) is given by :

$$SC_i = \sum_{j=1}^{11} score\ item\ j \qquad (4)$$

And the average score of all the leaders (or all the members) is given by :

$$SC = \frac{1}{n} \sum_{i=1}^{n} SC_i \qquad (5)$$

Where *n* is the total number of leaders (or the total number of members).

5. DATA

5.1 The survey

The data used in this study are from the Survey on the impact assessment of agro-pastoral programs and projects in Cameroon (EIPA). It was realised in 2009 by the Ministry of Economy and Planning (MINEPAT). Its main objective was to appreciate the changes in

living conditions of rural household due to government intervention, assess the management of different supports, assess the effectiveness of administrative control, and, collect suggestions for improving government interventions.

In this survey, Agro-pastoral activities were grouped into three categories: (i) the subsistence farming: cereals, tubers, bananas, fruits and vegetables; etc., (ii) the cash crops: cocoa, coffee, cotton, bananas, palm; and (ii) breeding and related activities, hunting, fishery, forestry.

The scope covers all the 10 regions of Cameroon. The sample consists of (*see more details in appendix, table A2*):

- 60 heads of departments or managers of programmes/projects;

-340 heads of decentralized services;

- 1350 leaders of association or group of producers;

- 1350 members of these organizations.

This survey has two main databases. The database of "Members" has information on the demographics characteristics of the members, their opinions on changes in their living conditions, the management of various supports and the major constraints. The "leader" database has information on leaders and on characteristics of famers' organisations.

Non-response is very common in this survey. Hotdeck Random method was used to treat missing values. This method produces an "artificial valve" to replace the missing value with a value chosen in its neighbourhood. Variables having non-response rate higher than 30%were dropped.

5.2 Some descriptive statistics of the data

Table 3 below shows that FOs are relatively small, more than 50% have less than 13 members and about 15% have more than 30 members. In average, they consist of about 48% women and 33% of young people. So, there is an overall gender balance in FOs. But, young people (persons under 35 years) are underrepresented, while they constitute over 60% of the Cameroonian population.

We also note that some 67.8% of FOs are headed by a male. But, 51% of FOs headed by a woman have benefited against 50% of those headed by a man. By field the domain of activity, we note that 67% of sample FOs are exercising in agriculture, 24% in breeding and 9% in other agricultural activities (fishery, hunting, etc.). The fact that an FO is beneficiary or not may depends on its age. Indeed, only 43% of FOs aged 8 years or above are beneficiaries, whereas 71% of young OP (less than 2 years) received support from the state.

In the sample more than half of respondents FOs have benefited from a state project or programme. Indeed we have 50.3% of beneficiaries against 49.7% of non-beneficiaries. The beneficiary FOs are more profitable than the non-beneficiary; their average annual production per capita estimated 136 000 CFAF (275 USD) versus 128 000 FCFA (256 USD) for non-beneficiary FOs.

Table 3: Some statistics on the sample of farmers' organisations by agro-ecological zone

	Sahel zone	Mountains 'zone	Forest zone	National
Average Production per capita in (thousand of CFAF)	114.1	101.0	159.6	131.5
Proportion of women (in %)	46.2	55.2	44.2	47.7
Proportion of youths (in %)	34.4	30.6	34.4	33.4
Domain of activity				
Breeding	18.3	26.5	26.0	23.9
Agriculture	66.7	67.4	67.0	67.0
Other activities	15.0	6.2	7.1	9.2
Together	100.0	100.0	100.0	100.0
F0 size (numbers of members)				
less than 10 members	21.4	18.6	38.0	28.2
10 to 12 members.	27.7	20.3	23.6	24.0
13 to 20 members	29.8	26.5	19.8	24.4
21 to 30 members	10.2	15.1	7.6	10.3
more than 30 members	10.8	19.6	11.1	13.2
Together	100.0	100.0	100.0	100.0
FO Age				
Less than 2 years	7.8	4.2	8.0	7.0
2-4 years	45.9	35.1	42.8	41.7
5-7 years	29.4	30.6	35.2	32.3
more than 7 years	16.9	30.2	14.1	19.0
Together	100.0	100.0	100.0	100.0
Sex of the leader				
Male	69.7	68.0	67.6	68.3
Female	30.3	32.0	32.4	31.7
Together	100.0	100.0	100.0	100.0
Level of education of the leader				
Never go to school	25.2	7.2	1.3	9.8
Primary	32.1	38.3	22.2	29.1
Secondary 1st cycle	24.9	25.5	34.4	29.4
Secondary 2st cycle	14.7	15.9	28.5	21.3
Higher education	3.0	13.1	13.6	10.4
Together	100.0	100.0	100.0	100.0

Source : EIPA Survey (2009). Our calculations

6. RESULTS

This section presents the results on the impact evaluation of agro pastoral projects on farmers' organizations. The first point is about the quantitative approach based on the Kernel matching and the second point focuses on the qualitative approached using Likert' scale.

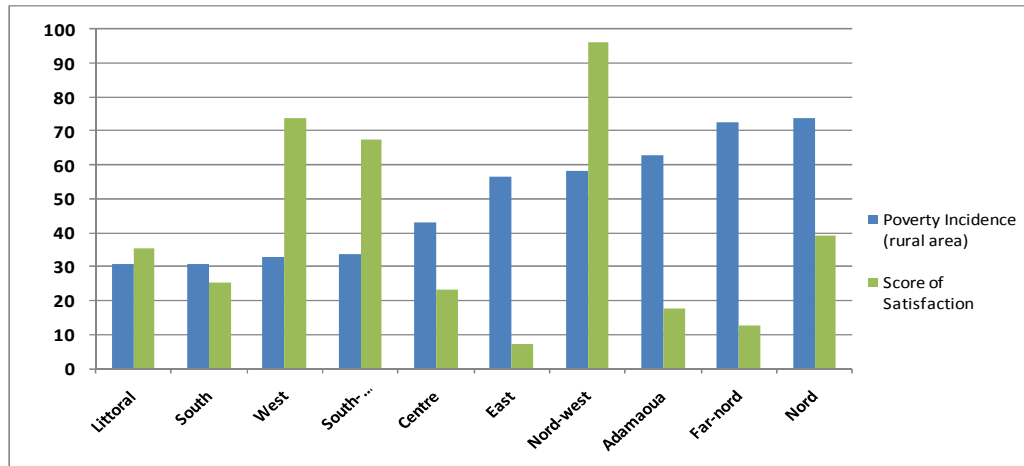**6.1 Analysis of the satisfaction of the beneficiaries of grants**

This analysis is done regarding leaders on one hand and regarding the members on the other hand. It will also be done according to the regional level and the domain of intervention of projects.

6.1.1 Analysis of the satisfaction of the leaders

The satisfaction score calculated is positive, indicating an overall satisfaction of leaders of farmers' organizations vis-à-vis of the grants they received from the state over the period 2002-2008. However, there are regional disparities. Indeed, the satisfaction of the leaders seems to be negatively correlated to the level of poverty of the regions. The Centre, the Far-nord, the Adamaoua, the East and the Nord regions which levels of poverty is above the national level (39.9%) are significantly less satisfied with grants than other regions. However, the nonparametric test of Spearman and Kendall does not support this idea at the threshold 5%.

A more detailed analysis of the level satisfaction of leaders reveals that they appreciate the impact of subsidies on social development (education, health, etc.). All regions feel satisfied about this aspect although the greatest satisfaction levels are found in regions where poverty levels are quite low. They also mention an improvement in their socio-cultural development in terms of empowerment of women, promotion of youth, the disabled and other vulnerable people. By cons, they feel that efforts in improving information on prices and market access were unsatisfactory.

<u>Figure</u> Level of satisfaction of leaders and rural poverty incidence by region

6.1.2 Analysis of the satisfaction of the members of farmers' organisations

In the case of members we have selected five focus areas of the state and its partners: social progress, diversification of production, improved farm management, the security of employment, work productivity, access and use of inputs. Satisfaction levels the highest, as in the case of leaders, are more important in regarding social progress. As for the social progress, all regions are satisfied. However, members of organisations of the Far North as well as their leaders feel dissatisfied with the actions of the State and its partners regarding the improvement of productivity.

6.2 Assessing the impact of agro-projects in Cameroon: the quantitative approach

6.2.1 The propensity score: likelihood of benefiting

This is the first step in implementation the matching based on predicted probability. In this step, it comes to model the probability for an FO benefit of a state agro pastoral project. To do this, we conducted a logistic regression where the dependent variable is the variable T (*T = 1 if the FO is a beneficiary and 0 otherwise*). Explanatory variables are the agro-ecological zone, the domain of activity, the size, age of the FO and some socio-demographic characteristics of the leader of the organisation.

Table 4 summarizes the results. The quality of the model is satisfactory as it explains 30% of the variability. Regarding the characteristics of the FO, we can note that the proportion of youth significantly increases the probability of an FO to receive support from the state. While

the proportion of women seems to reduce it. The relationship between the likelihood of benefiting and the size of the FO seems to be nonlinear. In the order hand; the government seems to give more importance to younger FO to the extent that the likelihood of receiving subsidies decreases with the FO age. Indeed, a FO of 5-7 years is three times less likely to have the support of the State compared to a young FO (under 4 years), the odds ratio increases to over 15 when we rather consider FOs of more than7 years old.

According to the characteristics of leaders, a FO headed by a woman is more likely to be beneficial than a FO headed by a man. In addition, a FO whose leader is over 40 years is more likely to benefit compared to a FO whose leader is under 40. There would be no relation between the level of education of the leader and the likelihood of benefiting.

Table 4 : Logit model estimation : the propensity score

Variable	Odds ratio	Robust Standard Error
Proportion of women	0.977***	0.004
Proportion of youths	1.032***	0.004
Number of members (ref= less than 10)		
10 to 12 members.	2.158***	0.545
13 to 20 members	1.510**	0.376
21 to 30 members	1.273*	0.459
more than 30 members	1.820**	0.519
Agro ecologic zone (*ref. forest*)		
Mountains	1.427*	0.337
Sahel	0.304***	0.072
FO age		
5-7 years	0.369***	0.073
more than 7 years	0.063***	0.018
Domain of activity (*ref. breeding*)		
Agriculture	0.120***	0.026
Other agro-pastoral activities	20.517***	10.137
Sex of the leader (*ref. male*)		
Female	4.021***	0.971
Level of education of the leader (*ref. Never go to school*)		
Primary	1.146	0.400
Secondary 1st cycle	0.915	0.328
Secondary 2st cycle	0.961	0.363
Higher education	0.680*	0.302
Age of the leader (*ref. Less than 40 years*)		
40 years and above	3.065***	0.703
Statistics of the model		
Number of Observations	1 146	
Prob > chi2	0.000	
AURC (area under ROC curve)	0.831	
Pseudo R2	30.3%	

*Source : EIPA Survey (2009). Our calculations   *: significant at 10 %;   **: significant at 5 %;   ***: significant at 1 %.*

6.2.2 Estimating the causal effect

To assess the causal effect, we have focus only on the agriculture sector and the breeding sector. We excluded other agro pastoral activities (fishery, fish farming, hunting, etc.) due to

their high heterogeneity. We have implemented the ordinary and two matching methods: one-to-one matching with replacement and kernel Epanechnikov matching. Both matching methods have been restricted to the common support because the inclusion of FOs that are out of this support may bias the estimates. Results are presented in table below.

We note that in the livestock sector, the average effect of agro projects is positive regardless to the method used. According to the OLS method, the average overall effect is 16% (about 42 USD per member). The matching methods show that the average effect on beneficiaries FOs is an increased of 18% to 21% of their annual output per member. While non-beneficiary FOs would have experienced an increase of their productivity of 7% to 22% if they had benefited. In the other hand, subsidies seem to have had no significant impact on FOs exercising in food crops and cash crops. Indeed, OLS suggests a positive impact overall average of 1.4%; however this figure is not statistically different from zero at the threshold 10%. The one-to-one matching indicates that the average effect of projects on subsidized OP is only 0.4%. But, this result contradicts that of the kernel matching which indicates that subsidies would rather have had a negative effect on beneficiary OP.

Table 5: Returns to government's subsidies/assistance

		Returns to government grants/subsidies (in %)		
		Breeding	Agriculture	Together
Difference of productivity before matching		25.9	1.4	10.6
Ordinary Least Squares (OLS)		16.1**	-1.9	4.0
One to one matching	Effect on the treated (ATT)	20.9**	0.4**	3.4
	Effect on the non-treated (ATNT)	7.4***	11.1**	6.6
Kernel Epanechnikov	Effect on the treated (ATT)	18.9***	-4.4*	-0.2
	Effect on the non-treated (ATNT)	21.9***	2.1**	12.1

Source: EIPA Survey (2009). Our calculations   *: significant at 10 %;   **: significant at 5 %;   ***: significant at 1 %.

7. Conclusions

The study aimed to evaluate the impact of projects and programs on productivity and satisfaction of farmers' organizations in Cameroon. The methodology is based on an integrated assessment approach combining both qualitative and quantitative aspects. The qualitative analysis uses Likert scale. The quantitative approach is based on Rubin's causal model and uses propensity score matching techniques. The main data used are those of the survey on the assessment of the impact of projects (EIPA) conducted by Ministry of Economy and Planning in 2009.

The qualitative approach has five mains focus: social progress, diversification of production, improved farm management, the security of employment, work productivity, access and use of inputs. The results reveal a convergence in appreciation between leaders and members of organisations. As for the social progress, all regions are satisfied. However, members of organisations of the Far North as well as their leaders feel dissatisfied with the actions of the State and its partners regarding the improvement of productivity.

The relationship between the likelihood of benefiting and the size of the FO seems to be nonlinear. The government seems to give more importance to younger FO to the extent that the likelihood of receiving subsidies decreases with the FO age. Also a FO headed by a woman is more likely to be beneficial than a FO headed by a man. In addition, a FO whose leader is over 40 years is more likely to benefit compared to a FO whose leader is under 40.

The matching techniques revealed that farmers' organisations aid recipients have experienced an of 4% increase in their productivity. More specifically, the study reveals that the impact of government programs is more important in the breeding sector (16%) and in the agriculture sector is quite zero. Furthermore, non-beneficiaries organisations of the breeding sector could have had an increase of their productivity of about 10% if they had benefited from government assistance

About policy recommendations, there is a need to increase the impact of projects and programs on the development of rural activities, and thus to reduce poverty, the State of Cameroon would benefit from:

1 – Updating the existing file of FOs with contact information, this would combat the existence of fictitious FOs (indeed, it was realized that some beneficiary FOs have ever existed on field).

2. Encouraging rural people to form themselves into organizations to be more efficient and easier to solicit assistance;

3 - making the process for awarding grants more transparent, as people pointed out that the grants are often awarded based on criteria such as the segregationist, political affiliation, ethnicity or "networks";

4- Increasing the budget devoted to the development of rural areas;

5- Establishing a permanent monitoring and impact evaluation of agro-pastoral projects.

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APPENDIX

Table A1: Section 2.3 of the questionnaire "perception of the impact of state interventions"

S2Q15	Indicate how state interventions have influenced your activities and living conditions in terms of:	1= Positive 2= Null 3= Negative	Explain ?
S2Q15a	Access and use of inputs (fertilizers, pesticides, improved seeds, land, water, raw materials, ...)	I__I	……………………………………
S2Q15b	Knowledge of innovative practices, production techniques	I__I	……………………………………
S2Q15c	Farm productivity	I__I	……………………………………
S2Q15d	Safety Conditions	I__I	……………………………………
S2Q15e	Improved farm management (harvesting, storage, ...)	I__I	……………………………………
S2Q15f	Diversification of production	I__I	………………………………………
S2Q15g	Price information and market access	I__I	………………………………………
S2Q15h	Structuring your organization and its contacts with other structures	I__I	……………………………………
S2Q15i	Environmental preservation	I__I	…………………………………
S2Q15j	Social development (housing, education and health for themselves and relatives)	I__I	…………………………………
S2Q15k	Cultural development (women's empowerment, youth development, disabilities, other vulnerable people, ...)	I__I	……………………………………… ………………………………………
S2Q15l	In general, how do you assess the impact of state interventions in the agro pastoral?	I__I	………………………………………

Source : EIPA Report, 2009

Table A2 : Summary of the sample design

Region	Total number of FOs	Number of F0s sampled	Number of beneficiaries
Adamaoua	2 638	120	75
Centre	22 683	240	160
East	4 112	120	75
Far-nord	12 930	150	100
Littoral	8 769	120	75
Nord	5 468	120	75
Nord-west	11 564	120	75
West	8 175	120	75
South	6 420	120	75
South-west	6 561	120	75
Cameroon	**89 320**	**1350**	**860**

Table A3: Some statistics on the sample of farmers' organisations

	Beneficiary FOs	Non-Beneficiary FOs	Together
Average Production per capita in (thousand of CFAF)	135.9	128.2	131.5
Proportion of women (in %)	46.2	49.1	47.7
Proportion of youths (in %)	34.5	32.3	33.4
Domain of activity			
Agriculture	46.3	53.7	100.0
Breeding	56.9	43.1	100.0
Other activities	63.8	36.2	100.0
F0 size (numbers of members)			
less than 10 members	50.5	49.5	100.0
10 to 12 members,	52.8	47.3	100.0
13 to 20 members	50.0	50.0	100.0
21 to 30 members	47.0	53.0	100.0
more than 30 members	48.7	51.3	100.0
FO Age			
Less than 2 years	70.5	29.5	100.0
3-4 years	51.6	48.4	100.0
5-7 years	49.7	50.3	100.0
more than 7 years	43.2	56.8	100.0
Sex of the leader			
Male	50.1	49.9	100.0
Female	51.1	48.9	100.0
Level of education of the leader			
Never go to school	46.4	53.6	100.0
Primary	50.6	49.4	100.0
Secondary 1st cycle	51.0	49.0	100.0
Secondary 2st cycle	51.6	48.4	100.0
Higher education	48.7	51.3	100.0
Together	*50.3*	*49.7*	*100.0*