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An Economic Appraisal of Cocoa Production in Cameroon: The Case Study of Lekie Division

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1. INTRODUCTION

Prior to oil exploitation, Cameroon's major export commodity was essentially agricultural. It contributed for about 80% of the total exports. But in 1978, oil exploitation quickly became the engine of economy growth. With the presence of oil, the economy of the country still remains greatly agrarian with about 80% of the population involved in agriculture and this explains the important contribution of agro-product (40%) to the Gross Domestic Product (GDP) of Cameroon. The major export crops of the economy are cocoa, coffee and cotton. Statistical evidence indicates that Cameroon is sixth world largest producer of cocoa (ICCO, 2003). However, despite the huge proportion of the population involved in the agricultural sector, the country still experiences poverty with 48% of its population living below the poverty line (World Bank, 2002). In recent years, crop production witnessed serious decline as a result of inadequate institutional capacity and fluctuation in world prices. In response to this, the government in 2001 announced an adjustment programme to revive cocoa and coffee production but this was proven abortive.

Since the displacement in 1995 of the National Product Marketing Board (NPMB), the cocoa output has remained steadier rather than shifting upward (ICCO, 2003).This phenomenon has led to drastic reduction of the gain by farmers and deepens the poverty situation couple with the decline in cocoa price at world market. The decline in the world price of the cash crop product rather triggered the international competitiveness of agricultural product and fuggier other macroeconomic aggregates in Cameroon, for example, the debt payment that was generally drawn from the export receipts witnessed and increase and recurring delay in servicing it. This scenario may persist if cocoa production is not adequately taken care off. It should be noted that the cocoa production is treated as extractive industry with fertilization from forest litter. Consequently, traditional methods, inadequate labour result to meaningless yield (about 326kg/ha) and low returns to farmers (Harpooning and Sanders, 2002). Concurrent, other control measures were not productive. This study is therefore investigating the profitability of cocoa production among farmers in Lekié Division in Cameroon. Specifically, the study seeks to identify the major problems faced by cocoa producers, determine the cost and benefit from cocoa production and examine the efficiency of resources used by cocoa farmers in the Lekié Division.

In capturing the relationship that exist amongst the variables in the study, some hypotheses where set to be tested and they are as follows:

1. Ho: The problems faced by cocoa producers don't influence their cocoa output.
   H1: The problems faced by cocoa producers influence the cocoa production
2. Ho: Cocoa production in the Lekié area is a non-profitable activity
   H1: Cocoa production in the Lekié area is a profitable activity
3. Ho: Resources used by cocoa farmers are inefficient.
   H1: Resources used by farmers are efficient.

Cameroon economy is basically agrarian and petroleum oriented. The agricultural sector plays an important role in the GDP growth with the major participation of cash crop of which cocoa, coffee and cotton are central. It follows cocoa is a tropical lowland crop that grows best where annual rainfall when at minimum is 114 cm with an average temperature of 27^0C. Areas with long dry season are not favorable to the growth of cocoa. The justification of this study is anchored of the fact that this particular cash crop has become a major component of net export crop in Cameroon, Nigeria, Cote d'Ivoire, Togo and Ghana (Uba, 1999). Consequently, the attention paid by Cameroon government to the growth of cocoa production remains questionable, ICCO, 2004 records clearly stated that 69% of the world cocoa product is from Africa. Cameroonian cocoa is the most sorts after brands of cocoa (Uba, 1999). The reason d'être of this research work is also anchored on the fact that to date there is hardly any study that specifically examine the cost and benefit analysis of cocoa production by the farmers in that area of Cameroon. The choice of lekie is articulated on the fact that the Division is at the forefront of cocoa production in the country.

Organization of the Study

The research is divided into five sections. The first section focused on the introduction, while section two emphasized on the literature review and theoretical framework. The research methodology is devoted to the third section. Presentation and empirical analysis of data are contained in section four. The conclusion, summary of findings and policy recommendations are detailed in section five.

II. Theoretical framework and Literature review

The concept of production function

This study hinges on the production function analysis. Olayide, (1982) defined production function as a mathematical expression of the relationship between the level of production of a commodity and the levels of the factors affecting the production. However, production function analysis provides estimates of Marginal Productivities (MP) and Returns to Scale (RTS) in production when compared with their factor prices, Marginal Value Productivities (MVP) of resources provide answers to questions involving the optimal level of production and combination of factors. Production function provides a guide to entrepreneurs in making decision with regard to the optimal use of scarce resources. Different forms of production function exist, some of which are the quadratic, exponential, Cobb-Douglas (double-logarithmic), semi logarithmic, translog and the constant elasticity of substitution (CES) functions amongst others.

It follows from the production function analysis that a dual approach can be used to explore the relationship between production, cost and profit function. Consequently, it is possible to derive profit and cost functions from an underlying production function. There is in fact, a duality between production and profit (cost) functions such that the existence of one implies, for well-behaved function, the unique existence of the other.

The theory of cost: In the process of agricultural production, as in any other productive process, cost is incurred. This is so because scarce resources, which command price and have alternative uses are always employed.

There are many cost concepts but in this study, attention will be focused only on fixed cost, variable costs, average cost and marginal cost. The total cost of production will be broadly categorized into fixed and variable cost although this classification is meaningful only in the short run because in the long run all factors of production are variable.

Fixed costs: *These are the overhead production costs, which do not vary with the level of production. Examples are salaries of permanent staff, rent on land, and depreciation allowance on fixed assets, such as farm buildings, fence, machinery and equipment. Again, the concept of fixed cost is meaningful only in the short-run. In the long run, every cost becomes variable.*

Variable costs: *These are the cost incurred as a result of the use of variable inputs in the production process. Variable costs vary with the level of production. Examples are the wages of unskilled labour, transportation cost, cost of planting materials, such as seeds and seedling and the cost of fertilizers and chemicals such as, weedicides, insecticides etc.*

Total cost: This is the summation of fixed cost and total variable cost.

A mathematical formulation of total cost can be expressed as follows:

TC = TFC + TVC

Where, TC represents total cost, TFC stands for total fixed cost and TVC means total variables cost

Average total cost: *This is total cost (TC) divided by output. It is the summation of average fixed cost (AFC) and average variable cost (AVC) divided by the output level (Q).*

$$ATC = \frac{TC}{Q}$$

$$ATC = \frac{TFC}{Q} + \frac{TVC}{Q}$$

Graphically, the average and the marginal cost curves can be represented as in figure 1.

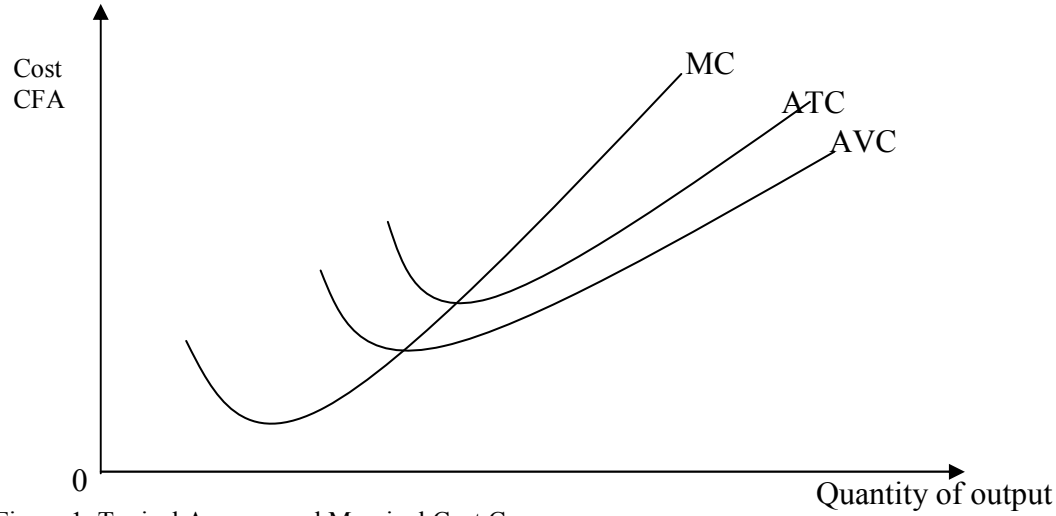

Figure 1: Typical Average and Marginal Cost Curves**.**

Long-run theory of cost: *The short-run is that time period so short that the level of certain productive resources cannot be varied with output. Production operations take place in the short-run. On the other hand, the long-run is the planning horizon, so long that all productive resources become variable as output level changes. The long-run total cost curve is the cost – output equivalent of the expansion path. The long – run average cost (LRAC) curve can be thought of as an envelope of several short – run average cost (SRAC) curves. It shows the minimum unit cost of producing every feasible level of output. Figure 4 shows the graphical representation.*

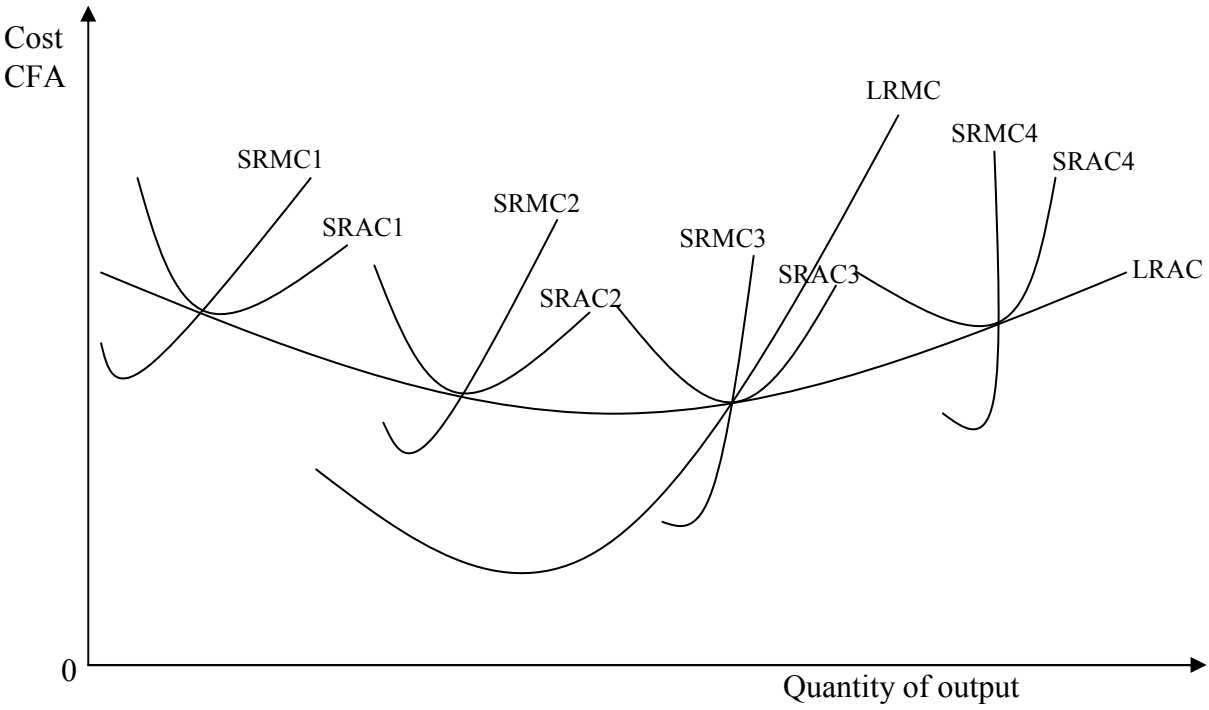

Figure 2: Long – run Average and Marginal Cost Curves.

The long – run marginal cost (LRMC) curve shows the minimum amount by which cost is increased when output is expanded by one unit or the maximum that can be saved when output is reduced by one unit. The LRMC intersects LRAC when the latter is at its minimum point (fig. 2). Although emphasis has, in this study, been put on the explicit costs (costs of the factors of production), the existence and relevance of the alternative cost concept of opportunity or implicit cost is equally recognized. Opportunity cost is the maximum earning that might have accrued if the entrepreneur's time and resources had been devoted to the best alternative use.

Apart from the private (implicit and explicit) costs so far dealt with, the society as a whole equally incurs some cost (social costs) when her resources are used in production.

The concept of revenue

Total revenue: *This is the gross receipt obtained from the sale of the total product. If TR represent total revenue, Q quantity produced, and P the unit output price, then total revenue is TR = QP.*

Average revenue: *This is the revenue divided by the total quantity of sales. Under the assumption of perfect competition, this is equal to unit output price.*

Marginal revenue: *This is the amount of change in total revenue consequent upon a unit change in total sales. Under perfect competition, marginal revenue, average revenue, and unit price are the same.*

Agriculture cost factors

The factors of production in agriculture, like those of other forms of production, are traditionally classified into land, labour, capital and management. The costs of agricultural production include the returns to all factors committed to production, such as the wages of hired labour, rent on land, interest on capital, cost of machine hire and expenses on seedlings, fertilizers and chemicals.

The cost of cocoa production varies with the age of plantation, since some operations are age specific and make different demands on the use of farm resources.

Labour: *The resource called labour is the work done by human being, and not the persons themselves. When a farmer hires a laborer, he is buying only so many hours of work and not the man himself (Upton and Antonio, 1965). Cocoa production is a labour – intensive project. According to Adeyokunnu (1975), labour cost constitutes over 70% of total cost of cocoa production. In the light of this, the cost of cocoa production would be highly sensitive to variations in labour cost across time and space. Labour in agriculture could be categorized into family, communal, share cropper and hired labour.*

Family labour: A labour use pattern where wives, children and other dependent residing together form the labour force. This was identified by Adegeye and Dittoh (1982) as being prominent among farmers in Nigeria. Consequently, another author reported that farmers in Nigeria go into polygamy so as to generate labour hands through their wives and children.

Hired labour: in this context, human effort is used to achieve another person's goal but this effort is compensated. According to Assoumou (1977), and Norman (1978), hired workers contribute little to the supply of labour in most food and cash crops farms in Cameroon, Nigeria and other African countries. The predominance of hired labour in farming activities in the 1980s due to underemployment and unemployment has led to various form of hired labour, among which is share cropping.

Exchange labour: in this pattern, farmers around a particular area organize themselves into working groups. They work in turn on each others farm until the cycle is completed (Adegeye and Dittoh, 1982).

Labour availability imposes major limitations on crop types and cropping intensity on farms due to differential response of crop to labour requirements (Olayide et al., 1978). The labour utilization pattern in cocoa farms has witnessed a change in its operational and cultural practices, brought about by the introduction of what could be described as cooperative effort in the entire management. Labour input is measured in man-day; one man-day being an equivalent of eight man-hours.

Land: *Land is the most important factor in agricultural production in general, and in cocoa production in particular. Unlike most of the other resources, land is not sold for agricultural purposes in the study area. The commonest types of cocoa land ownership in the study area are by first occupation, inheritance, and share cropping. Strangers are not normally allowed to grow permanent crops such as cocoa. According to some researchers, cocoa requires deep, well drained soil with high nutrient content and a clayey texture. Land with suitable soils and terrain for the crop are in short supply while crop diversification has led to genuine competition for the remaining good lands.*

Capital: *Capital is the total economic value of resources available for use in the farm business (Castle et al. 1972). The role of capital in cocoa production is crucial since capital may be used to acquire all the other factors of production (labour, material inputs and machine, etc.). Physical assets consist of a stock or an inventory of assets possessing money value. In cocoa production, they include cutlass, axes, pruning saws, drying floor, harvesting knife, baskets, wooden rake, jute bags, polythene sheets, sprayer, siever, sweat boxes.*

The other type of capital (working capital) is used to purchase variable inputs, such as the payment of wages of hired labour and expenses on seedlings, fertilizers, fungicides, insecticides, transportation, etc.

Since the capital accumulation capacity of farmers is usually small, credit (capital supply) is commonly a way of financing agricultural projects. Credit can be in kind or cash. The common sources of credit to cocoa farmers are loans from friends, relatives, professional money lenders, produce buyers, common investment group, producer association group and cooperatives. Agricultural Credit Cooperative and Commercial Banks constitute other sources.

Revenue concept in agriculture

This subsection discusses all the possible sources of revenue in a cocoa farm. The revenue accruing to the farmer is a function of the output and the price he receives for his produce. Also, both output and grade are subject to the vagaries of weather, crop variety, cultural and other management practices adopted and the managerial skill

of the farmer.

In cocoa production, the time at which yield starts to accrue depends on the method of rehabilitation adopted. While in complete felling and replanting there is a break in the yield profile, in chupon regeneration, improved management and planting of improved seedling variety under the shade of old cocoa trees, the yield from the old trees is continuous while the young chupons or seedlings develop.

Other possible revenue sources include the proceeds from sale of plantain and banana fruits, where and when banana and plantain are used as the nurse shade plants.

The profit behaviour

In simple terms, profit is total revenue less the cost of production. That is

$$\prod = TR - TC$$

Where $\prod$ is profit.

There is always a tendency for farmers to overestimate their profit. This is because they often fail to account for the opportunity cost of family labour, the depreciation of tools and the opportunity cost of land.

A rational former is assumed to be profit maximizing. He will produce the profit maximizing level of output; that quantity of output which will equate marginal revenue to marginal cost MR = MC. A second condition for profit maximization is that the marginal cost curve must be rising at the point of maximum profit (see figure 3).

That is

$$\frac{\partial MR}{\partial Q} < \frac{\partial MC}{\partial Q}$$

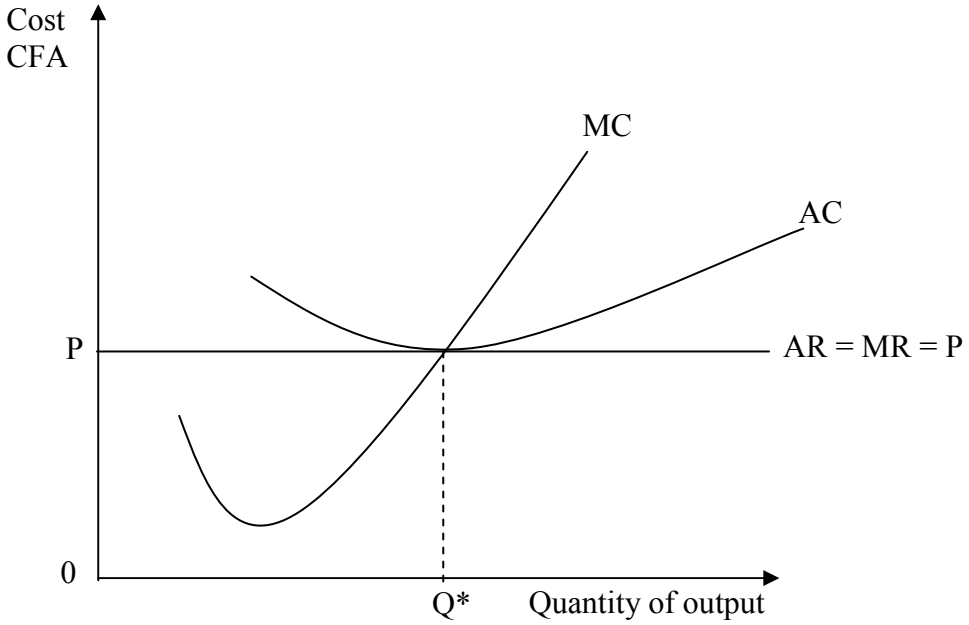

Figure 3: Long-run profit maximization in perfect competition

Returns to scale

The concept of returns to scale focuses on the rate at which an output changes when all factors of production (inputs) change simultaneously in the same proportion (Olayemi, 2004). It is only in the long run that all production inputs are variable. The mathematical formulation of this concept is expressed as follows:

$$v = \sum_{i=1}^{n} \frac{\partial Q}{\partial X_i} \cdot \frac{X_i}{Q} \quad \text{For i = 1, 2, … n input}$$

$$v = \sum_{i=1}^{n} MPP_{Xi} \cdot \frac{X_i}{Q}$$

The scale coefficient v is a positive number which may be greater than unity, equal to unity or less than unity. When the scale coefficient is greater than unity, we have increasing returns to scale in production. In this case, if the quantities of all inputs are increased by one percent, the quantity of output produced increases by more than one percent and vice versa. When the coefficient is unity (one), we have constant returns to scale. This means that the quantity of an output produced increases by the same proportion as that of all inputs. But when the coefficient is less than unity, we have decreasing returns to scale, implying that output increases by a lower proportion than that of all inputs, and vice versa.

B Literature review

Peasant farmers: scope and strategies for development

A country like Cameroon can restructure its economy by critically examining its resources base. Thus implies that with high agricultural potential. A number of authors argue, the agricultural sector must first be developed, and then move ahead to industrialized and pursue economic development, "*if agriculture remains stagnant, industry cannot grow*". He also discussed that export plays different roles at various stages of economic growth. As such, In Cameroon, Small-scale farmers (peasant farmers) contribute about 80% to the agricultural sector. The magnitude of which, call for the new strategic management of the category of farmers.

Olayide et al. (1981), classified small scale farms as those range from under 0.10 hectares holding to 5.99 hectares and he discovered that this class constitutes 80.78% of all farm holdings for Nigeria agricultural economy. He explained further that small scale farmers are very efficient in utilization of the basic productive resources available to them. The land as resource is properly utilized.

Schultz (1966), in his study of strategies of development for developing countries, posited that traditional agriculture may be poor but in terms of combining resources at hand, this agriculture is very efficient. His conclusion was based on the fact that no amount of reorganization of production can overweight that obtained under traditional agriculture.

Consequently, it follows that natural resources could be efficiently utilized if adequate incentives are given to the small-scale farmers. This, however, calls for a strategy for peasant agriculture development. According to Williams (1989), the strategies may have the following pattern. First, traditional land tenure system, which does not allow for individual ownership of land and which therefore constitutes an important handicap to agricultural development must be reformed. He further explained that land tenure system put many difficulties in the way adopting new and improved practices. Secondly, lack of credit is yet another handicap. Although it was hoped that commercial banking institution would extend credit to farmers, this is not worked out well for the past decade or two. This has been attributed to unwillingness of banks to extend loans to farmers because use the farmers do not poses satisfactory collateral that can be offered for security. Inadequate facilities, bad sanitary conditions, communicable diseases and child malnutrition are prevalent in rural areas. Peasant agriculture can be improved through better health facilities, inoculation against communicable diseases, better system of waste disposal, improvement of water supply and the inoculation of health education and information on better feeding habits.

This strategy is constrained by the behaviour of the youth particularly young people leaving school in rural areas do not want farm jobs rather they want jobs in the industries located in cities. A survey carried out by International Labour Organization (ILO) (1996) reported that 79% of the young people wanted to work in industry as to get further training in urban institutions. Fewer than 5% wanted to be farmers.

Williams (1978) further argued that given existing agricultural methods and farm productivity, if young people reject farming as a career, the capacity of the country to feed itself seems seriously threatened, that the need to find a solution is urgent. According to him, priority needs to be given to the farming system and to improvements within it.

Finally, a nation, according to Williams must possess adequate overall planning and coordination at the national level for effective agriculture development. He concluded that the machinery that exists for effective planning, coordination and implementation of a coherent national rural policy is grossly inadequate.

Scope of resources

Olayide and Heady (1982), defined broadly resource as any materials employed in the farm and it may either be stocked or flow resources. Stock resources are those factors which gives “stock services” in the sense that they are used up entirely in the production process. If they are not used up in one production process, they can be stored for latter period. On the other hand, there are the resources, which embodied flow services. If the services are not used when they are not given off from the resource, they will not be available in the latter period. The services of a barn or even of labour are of this nature.

Adegeye and Dittoh (1985), also defined resource as an inputs or factors of production and can be categorized into four even though the distribution between some of the categories is not too clear-cut. Firstly, these are natural resources such as land, water and local climate, which are given by God, but which could be more productive by man, secondly, we have labour, which is human resource or manual inputs. Thirdly, there is capital sometimes defined as a “produce means production” because it is in man made inputs and, finally, there is management in entrepreneurship, which is a qualitative kind of inputs. It is simply the effective harnessing of land, labour and capital resources.

Agricultural literature, explained that the resources of a society consist not only of the free gift of nature such as land forest and minerals but also of human capacity, both natural and physical and of all sorts of man made aids to further production such as tools, machinery and building.

Umeh and Adebisi (1988), based their own argument about resources on capital which is credit accumulation by the peasant farmers. Some researchers posited that farm input price have important implication

for farm operation productivity and output. High input prices could delay farm operation or even prevent the use of essential input in agricultural production. Farmers are therefore sensitive to change in input to output price relationships. However, Olayide and Heady (1982), affirmed the classification of factors of production into land, labour, capital, management or entrepreneurship or coordination and "free goods" such as air, heat, water etc. the distinction as two "economic" and "free" goods is of limited used for a great number of resource use problem in production.

Harounan, (2001) noticed that with the long run falling in real international prices in cocoa; there has been a general stagnation in the sector in Cameroon. One consequence of this diminished profitability is the decline in the use of pesticides; control of both Black Pod disease and capsid bugs is well known to be essential for high quality cocoa and for increasing yields. He further mentioned that government had subsidized the cost of this control, but with the structural adjustment, the government stopped the input subsidies and farmers are no longer effectively controlling these pests. Based upon expert's estimates of the degree of pest control, he noted that in the rainforest, pests are very serious leading to output best of 35 and 65%. He concluded that it is economically feasible to eliminate all of this damage but it becomes more profitable to eliminate damage as the yields increase with increased fertilization or new cultivars.

III. Methodology and model specification

The theoretical framework underpinnings this research work is drawn from the theoretical strand of the cost and benefit analysis this is done, through the various components of the theoretical framework discussed earlier in the study. And, this it is discussed in turn

Marginal Analysis.

This was used to analyze the resource use efficiency. The following procedure was used. From the regression the Marginal Physical Product (MPP) can be calculated for each input (X_i).

$$MPP(X_i) = \frac{\partial Q}{\partial X_i}$$

And so the Value of Marginal Product (MVP) is derived from MPP.

$$MVP(X_i) = MPP(X_i) \times P_Q$$

Where P_Q = the price of output.

At this point the following hypotheses have been stated.

$$MVP(X_i) = P_{X_i}$$

1. If $MVP(X_i) < P_{X_i}$ we consider that the resource is over utilized and so the utilization of the input should be reduced in order to reach the equilibrium point where $MVP(X_i) = P_{X_i}$.

2. If $MVP(X_i) > P_{X_i}$, we consider that the resource is under utilized and so more input should be made use of in order to reach the equilibrium point where $MVP(X_i) = P_{X_i}$

3. If $MVP(X_i) = P_{X_i}$ we accept that the resource is efficiently used.

Budgetary Analysis.

This was used in analyzing the profitability of cocoa production activity through the determination of the cost and returns of the farm.

It involves finding the Gross Margin (GM) which is the difference between the average total revenue (ATR) and the average total cost (ATC).

$$GM = ATR - ATC$$

Total variable cost will include the cost of labour (in Man-day), pesticide (in CFA francs). Total revenue includes the revenue obtained by selling cocoa output (CFA francs).

Data source/ Data collection

Data were collected from two types namely primary and secondary data. The primary data was obtained through the use of questionnaires and the method of administering the questionnaire is by personal interview. Secondary data were collected from the Cocoa-Café Inter-professional Council (CCIC), Ministry of Agriculture of Cameroon and Cocoa International Organization (CIO).

The survey was carried out during the months of May and June 2007. The sampling method adopted was multi-stage random sampling. All the Seven Sub-Divisions were considered as study population. From that population area fifteen villages have been chosen (first stage). 131 farmers were interviewed from those selected villages. Data on their socio-economic characteristics (sex, age, educational, marital status, etc.), the method of production, the sources of inputs use and problems faced by farmers in that area were assessed. The table below

shows the repartition of farmers among the villages.
The analytical techniques used are Descriptive statistics, budgetary analysis, marginal analysis and the multiples regression.

Descriptive Statistics: Descriptive statistics consist of frequency statistics tables and percentages. These were used in the analysis of the socio economic characteristics of cocoa producer in the study area.

Regression Analysis.

This was used to determine the main factors affecting cocoa production in the study area. Four specifications where assessed, namely the linear form the Double-log form, the semi-log and the exponential specification.

1. The Double-log form is given as follows.

$$\text{LogQ}_t = \beta_0 + \beta_1\text{LogFZ}_t + \beta_2\text{LogLM}_t + \beta_3\text{LogPC}_t + \beta_4\text{LogYE}_t + \beta_5\text{LogEL}_t + U_t$$

2. The semi-log form is specified as follows.

$$Q = \beta_0 + \beta_1\text{LogFZ}_t + \beta_2\text{LogLM}_t + \beta_3\text{LogPC}_t + \beta_4\text{LogYE}_t + \beta_5\text{LogEL}_t + U_t$$

3. The exponential form is specified as follows.

$$\text{LogQ} = \beta_0 + \beta_1 FZ_t + \beta_2 LM_t + \beta_3 PC_t + \beta_4 YE_t + \beta_5 EL_t + U_t$$

Where:
Q = Output in kg
FZ = Farm size in hectares
LM = Labour in man-day
PC = Pesticide cost
YE = Years of experience
EL = Education Level in years
β_i = Coefficient to be estimated
U_i = The error term which capture all other factors that can affect cocoa production but not taken into account in this study.

The assumption is that the error term U_i is normally distributed with mean zero and the variance one.

$$U_i \rightarrow N(0,1).$$

IV. Estimation and Validation

The main thrust of this section is to present the results of the survey conducted after which the discussion follows. In this wise a number of elements were considered. However, the socio-economic characteristics of respondents, and the productive resources cost and revenue and the regression output were the major focus.

4.1. Socio-Economic Characteristics of Respondents

A close look of these characteristics indicates that about 13.7% of respondents were female while 86.3% represented the male population. The age factor was also considered since in it appears critical in traditional agriculture for two major reasons mainly increased productivity and increased adoption of innovation. However, the reliance on rudimentary in the traditional agricultural production require power from human muscle as old farmers may not be efficient.

The responses of the survey following the age factor clearly shows that a greater proportion of farmers ranged between 41-60 years, while the cumulative statistics demonstrates that about 66% of respondents were between 21-61 years. Another factor that was considered is the marital status, a distribution of this indicator revealed that about 70% of respondents were married, while the remaining 30% is shared between single, widowed and divorced.

Following the marital status on the respondents is educational status since it is argued in the literature that, the level of education of farmer does not only raise productivity but also increase his ability to understand and evaluate information on new techniques. The statistics indicate that a greater percentage of respondents are those without certificates (40.1%) meanwhile the proportion of respondents with first school leaving certificate is 35% and the cumulative of 16.1% is for the respondents between GCE “Ordinary Level” and “Advanced Level”. It was also observed from statistics that 1.5% is the percentage of respondents that have B.Sc and above. An important observation from the survey is that 60.3% of the farmers have cocoa production as their principal activity meaning that the cocoa farmers are relatively old and this confirms the statistics obtained from the percentage of respondents considering their age.

Table 1: Socio-Economic Characteristics Distribution of Respondents

	Frequency	Percentage	Cumulative Percentage
Gender			
Female	18	13.7	13.7
Male	113	86.3	100.0
Total	131	100.0	
Age			
<21 years	1	0.8	0.8
21-40 years	23	17.6	18.3
41-60 years	62	47.3	65.6
61 and above	45	34.4	100.0
Total	131	100.0	
Marital Status			
Married	90	68.7	68.7
Single	13	9.9	78.6
Widow	24	18.3	96.9
Divorce	4	3.1	100.0
Total	131	100.0	
Education level			
No formal education	42	32.1	32.1
Primary school	65	49.6	81.7
Secondary school	21	16.0	97.7
Tertiary	3	2.3	100.0
Total	131	100.0	
Degree obtained			
No degree	63	48.1	48.1
First school leaving certificate	45	34.4	82.4
WAEC	15	11.5	93.9
GCE O level	1	0.8	94.7
GCE A level	5	3.8	98.5
B.Sc. and above	2	1.5	100.0
Total	131	100.0	

Source: Field survey, May-June 2007.

4.2. Resources used in Production

A number of factors were considered under this category

Table 2 below, more than 2/3 of the farmer (84.7%) inherited their land, while less than 1/3 (13.7%) purchased their land. Only a negligible percentage of respondents (1.5 %) rented their land.

Using the classification made by Olayide *et al*. (1980), we can classify the farmers in the Lekie division into three broad categories, namely, small scale, medium scale and large scale. Small-scale holdings range from under 0.1 ha to 4.99 ha, medium scale holdings range between 6 and 9.99 ha while large scale farmers fell between 10 ha and above.

From the tables below, the minimum and maximum size of land are 0.80 and 12ha respectively, while the average is 2.89 ha. From those tables, it can be noted that the cocoa production in Lekie Division is characterized by small farm holdings, about 2/3 of the farmers (71%) are small-scale farmers. Only 4.6 percent are medium scale farmers. This observation shows that the small sized nature of the farmland lead to small outputs in their agricultural productivity since the method of production is traditional.

The minimum and maximum distance between two cocoa trees is respectively 1 and 4 meters while the average distance is 2.5 meters (see table 2). This is not in conformity with the prescription of the Ministry of agriculture, which prescribed the average distance to be 3 meters. This can be one of the reasons that could justify the low productivity in that area.

Table 2: Distribution of Cocoa Trees:

	Minimum	Maximum	Mean	Std. Deviation
Number of cocoa tree	700.00	20,000.00	3,446.15	2,712.04
Space between two trees (meters)	1.00	4.00	2.59	0.66

Source: Field survey, May-June 2007.

The farming method in this area of study is traditional as almost 100% of the respondents use simple tools like cutlasses, hoes and diggers for the necessary activities on their farms. The cultivation of land, which

involves clearing of unwanted plants, replacing old plants with a new ones. Spreading and harvesting, is manually done using the simple local tools.

As regards the source of planting materials, many farmers (42.4%) relied on seedlings they made themselves. 32.6 percent of the farmers said they relied on local market, while only 2.3 percent of them affirm to rely on specialized centers as source of their seedlings. This reflects the exceeding gap between the research institute and the traditional farmers in term of the adoption of new discoveries.

Most of the farmers (72.5%) were assisted by the Common Investment Group (CIG), while Extension Agents assisted 60.3% of them. These observations testify the impact of liberalization intervened in 1995 into the cash crop sector in Cameroon (CICC, 2001).

The leading source of finance (40.5%) is the combination of the personal savings and the credit obtained from the Common Investment Group (CIG), followed by the personal saving source, which has 30.5 percent of the respondents. It is interesting to notice that there is no respondent who has bank loan as a source of finance. This shows the problem faced by small farmers in the form of complicated, cumbersome and time-consuming loan process procedure.

It has shown that 81.7% of the land used for farming is inherited and just 1.5% is rented however 13.5% is purchased. It follows from the statistics that cocoa leaves are used as fertilizer while two types of pesticide (fungicides and insecticides) are involved in the production process. It should be noted these pesticides are obtained mostly from the official market. However, the labour engaged in the use of the productive resources is mainly from family and hired labour. With the latter, coming in during the harvesting period. An analysis of child labourer was conducted and the statistics indicated that about 29% of farmers used children below the age of 15, meanwhile about 11% out the 29% engaged children aged between 6-7 years.

Table 3: Distribution of Resources used in Production

,	Frequency	Percentage	Cumulative Percentage
Source of Land			
Rent	2	1.53	1.53
Inheritance	111	84.73	86.26
Purchased	18	13.74	100.0
Total	131	100.0	
Farm Size			
0.1 to 5.99ha	93	92.08	92.08
6 to 9.99ha	6	5.94	98.02
10ha and above	2	1.98	100.0
Total	101	100	
Source of seed			
Personal	56	54.9	54.9
Local market	43	42.1	97
Specialized centre	3	0.03	100.0
Total	102	100	
Source of assistance			
No assistance from CIG.	36	27.5	27.5
Receive the assistance from CIG	95	72.5	100.0
Total	131	100.0	
Extension service			
No assistance from extension agent	79	60.3	60.3
Received assistance from extension agent	52	39.7	100.0
Total	131	100.0	
Source of credit			
Personal savings	40	30.5	30.5
CIG	14	10.7	41.2
Union	8	6.1	47.3
Bank loan	0	0	47.3
Personal and CIG	53	40.5	87.8
Personal and Union	14	10.7	98.5
Personal, CIG and Union	2	1.5	100.0
Total	131	100.0	

Source: Field survey, May-June 2007

4.3. Cost and revenue analysis

In order to appraise the cost involved in the production and the product yielded an analysis of the two concepts was conducted.

The total cost is composed by hired and family labour, pesticide cost and other relevant costs. The results of the cost analysis are presented in the table 4 below.

Table 4: Cost per hectare of different farms

Farm size	No of farmers	Total farm size (Ha)	Total cost (CFA)	Cost-Farm Ratio
0.1 to 5.99ha	121	283.2	20101500	70979.8729
6 to 9.99ha	8	48.00	1244000	25916.6667
10ha and above	2	20	265500	13275
Total	131	351.2	21611000	110171.54

Source: Field survey, May-June 2007

A close look at the table shows that the lowest cost of production is being incurred by farmers operating in the highest level proportion of land mass (10ha and above). However, farmers managing the smallest farm size incurred higher cost.

The revenue in this case is described as the receipt from sales or the values of the product during the cropping year 2006 – 2007. It follows that this revenue is obtained by multiplying the quantity of cocoa produced by the unit price. The summary statistics of result is provided in the table 5 below.

Table 5: Distribution of farmers by output and revenue

Farm size	No of farmers	Total farm size (Ha)	Total output (kg)	Output Price per Kg	Total revenue (CFA)	Revenue per farm size
0.1 to 5.99ha	121	283.2	284,560	500	142,280,000	502,401.13
6 to 9.99ha	8	48.00	25,200	500	12,600,000	262,500
10ha and above	2	20	2,400	500	1,200,000	60,000
Total	131	351.2	312,160	500	156,080,000	444,419.13

Source: Field survey, May-June 2007

A reading from this table indicates that the revenue of small-scale farmers is higher when comparing with other size of farmers. This is because of cheap cost of labour and other factor input used in production process.

4.4. Estimation and Validation of Regression Results

Several criteria are normally used in selecting the lead equation for the regression analysis. Such criteria include the value of the coefficient of determination R^2 which shows the variability in the dependent variable due to independents variables, the significance of individual coefficient measured by the T-statistic, the overall significance of the coefficients measure by the F-statistic, the value of the sum square error, the sign and the size of the parameters and whether or not it confirms the reality and the economic theory. This study used the ordinary least squares (OLS) technique to run the regression and the econometric package is Eviews4.1.

Table 6: OLS Regression Results

Variables	**Exponential**		**Semi-log**		**Double-log**	
	Coef.	t-Statistic	Coef.	t-Statistic	Coef.	t-Statistic
Constant	6.466	-21.969***	-6341.497	-6.519***	3.057	-8.367***
FZ	0.002	-0.129	-15.438	-0.059	0.032	-1.934*
LM	0.312	-1.689*	-344.425	-0.565	0.188	-8.182***
PC	0	-0.074	-66.527	-0.393	0.011	-0.168
YE	0.003	-10.548***	1694.775	-12.259***	0.839	-16.168***
EL	-0.07	-0.871	314.848	-1.031	0.016	-2.139**
R^2	0.50		0.56		0.70	
R^2(Adj.)	0.48		0.54		0.68	
S.E	0.67		1407.3		0.52	
F-value	24.48***		31.33***		55.73***	

Source: Computer print- out of survey data, 2007.

Note: *** t-values significant at 1%
** t-values significant at 5%
* t-values significant at 10%

Table 6 shows that the coefficient of determination (R^2) ranges from 0.50 – 0.70 meaning that all the inputs account for about 50% to 70% of the variability of the cocoa produced.

The Double-log production function was chosen as the leading equation because all its coefficients were positive, this means that as we increase the quantity used of variable inputs (labour, Land, pesticide,

Education level, etc.) the level of production also increases. This is conforming to economic theory of production. The value of the coefficient of determination R^2 is higher (0.70). This means the regression is 70% fit, the Sum of square error is the lowest 0.52 among other functional forms. At 10% level of significance, four independent variables explain the variability of the cocoa produce, while three explain that at 5% and just two are significant at 1% level of significance.

Elasticity of production: Elasticity of production as discussed earlier, measures the percentage change in the quantity of a product produced in response to a change of one percentage point in the quantity of an input used, with the levels of all other inputs held constant.

From the nature of Cobb-Douglas production function fitted, the regression coefficients can be directly interpreted as elasticity of production of variable inputs. Table 7 presents the results of elasticity of production for different variable inputs. Generally from theoretical consideration, it is expected that the increase in the input level will lead to an increase in the value of output, the positive sign in front of all the elasticity confirms these. All the values are low pointing to relative inelastic response of the output to the increase in these variables inputs. A 1% increase in Land, Labour Pesticide, and Educational level will lead to less than 1% change in the output level that is 0.03, 0.18, 0.83 and 0.01 respectively.

Table 7: Elasticity of production

Inputs	Coefficient(elasticity)
Land (FZ)	0.03*
Labour(LM)	0.18***
Experience (PC)	0.01*
Pesticide used (YE)	0.83***
Education level (EL)	0.01**

Source: Computer printing- out of survey data, 2007

Returns to Scale: The concept of returns to scale focuses on the rate at which an output changes when all factors of production (inputs) change simultaneously in the same proportion (Olayemi, 2004). It is only in the long run that all production inputs are variable. It follows that, from the field data, the sum of elasticity above (1.03) reveals that the farmers are producing at an increasing return to scale. They are operating at the first stage of production. They have to continue to increase the use of some and diminish the use of some inputs in order to reach the maximum level of production, which is in the second stage of the production function.

Efficiency of utilization of resources using the marginal value product (MVP): Table 8 shows the efficiency of resources used using the relationship between the marginal value product (MVP) and the prices (Px) of the inputs. The marginal value product was calculated from the results of the regression analysis. It was observed that land input was underutilized that is (444,419.13 CFA) is less than (500,000 CFA) which is the opportunity cost of land in the study area. Labour input was over utilized because its price (800 CFA) is greater than the value added to output (MVP) of (95 CFA). Hence some of the labour employed should be withdrawn so that the marginal value product will be equal to its price. The pesticide input was underutilized because its price (375 CFA) is less than the value added to output (MVP) of (420 CFA). Hence more pesticides input should be made use of in order to reach the equilibrium point where $MVP(X_i) = P_{X_i}$

Table 8: Analysis of the Resource Use Efficiency

Inputs	MPPx	P_Q	MVP	Px
Land	0.03	500	444,419.13	500,000
Labour	0.18	500	95	800
Pesticide	0.83	500	420	375

Source: Field survey, 2007

4.5. Problems faced by the cocoa farmers in the study area.

Most farmers in these areas are poorly educated or illiterate unfortunately; the extension system is poor and cannot afford new techniques and ideology to improve production.

In nearly all these areas, transportation remains a plight to the people. Cocoa product from the farm gate has to be carried on the head for long distances to neighboring villages before they can be marketed. This situation has gone along way to discourage farming among young school leavers.

The non-provision of farm loans pesticides, prizes for best farms, fertilizers and agricultural implement has contributed to reduce production in these areas.

In all these villages, marketing channels such as grading or stoppage centers have not been developed. Many middlemen operate between the producers, creaming off much of the farmer's potential profit.

Lack of rural development encourage able bodied men and women to immigrate from rural areas to urban centers where there are amenities such as pipe borne water, electricity, health services and recreational centers.

Lack of good storage facilities causes terrible waste of cocoa products especially as the harvest period draws to an end.

The lack of adequate information media such as television, radio and cinema, which might be used to inform the farmer on time and method of fertilizer application, distribution and method of planting of high quality seedling or prices and markets for his products also adversely affect cocoa productivity.

Due to lack of extension workers, the peasant system of farming remains the order of the day and this does not increase cocoa production in any form.

Generally in Cameroon, farmers are considered to occupy the lowest rank in society. Their skills do not receive the public recognition that those of other professions are given. Hence, people in white-collar jobs often do have a higher standard of life than the average farmer.

5. Summary Conclusions and Recommendation

The illiteracy of cocoa farmers in that Lekié contributed to their poorly productive capacity. Concurrently, the lack of access to new techniques and ideology to improve production rather triggered the already weak extension system. It therefore follows from the above observation; government should put in place a proper mechanism that will strengthen the efforts made the farmers. This policy could be achieved through allocation of loans, provision of pesticides, proper media programme to sensitize cocoa producers not in the studied are but throughout the country. Going by the regression results, statistical evidence shows that there is lack of incentive to cocoa farmers in Lekié. This demonstrated the poor coefficients of pesticides, labor, land and the level of education. One inference that can be drawn from this result is that the output deriving from their efforts can not compensate for their basic needs thereby maintaining in a chronic state of poverty. The decrease in the total production of cocoa in the country could also be attributed the death of National Product Marketing Board. Even Cameroon is small oil exporting country, agricultural product contribute to a great percentage of exports but the government seems not to encourage small scale agricultural production which is by inference drawing that category of farming backward. One of the recommendations of this study is that, cooperative system should be put in place the farmers and through this channel makes proposals to the local authority which can now properly address the farmers' constraints the government at the central level.

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