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Profitability analysis of smallholder cocoa production in South West Region of Cameroon

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Over the years, cocoa production in Cameroon has served as a source of employment for many smallholder farmers. However, aging trees amongst other factors is a limiting factor in the productivity of cocoa. The study compared the economic performances of different crop ages of smallholder cocoa production using primary data obtained by means of semi-structured questionnaires. Multi-stage random sampling was adopted to select 120 farmers. Data was analyzed using descriptive statistics and budgetary analysis approaches. The results revealed that cocoa production is male-dominated (89.2%) with limited land ownership (37.5%) and access to extension service (8.3%). It was established that cocoa production was profitable with pooled Net Farm Income (NFI) of 79 485 FCFA/ha and a Benefit-Cost Ratio (BCR) of 1.41. Comparing profitability of three different crop-age ranges: < 10, 10 - 30 and > 30, the crop aged group 10 - 30 years outperformed the others on all profitability ratios. Thus, it is recommended that for the sustainability of the cocoa sector, farmers should start considering the rehabilitation of their farms only after 30 years.

Key words: Profitability, gross margin analysis, cocoa, crop-age performance, Cameroon

INTRODUCTION

Cocoa is a significant contributor to Cameroon's economy. It was ranked second amongst Cameroon's top export commodities in 2016, with a total contribution of about $524 million to the economy and accounted for 14.8% of total exports after crude petroleum for 29.8% (OEC, undated). Approximately 400,000 to 600,000 families in Cameroon are involved in cocoa growing and about 95% of these farmers are smallholder farmers with an average farm size of 2.5 to 5 ha, who depend on this activity for their livelihood (Hütz-Adams et al., 2016). Despite the importance of the cocoa industry to the economy of Cameroon, the sector is still plagued by low productivity, low cocoa beans quality and low prices. Cameroon's cocoa is sold both in the international and domestic markets, with the price determined in the world market. About 90% of cocoa is exported and the

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remainder processed locally (CTA, 2010). According to ITC (2001), Cameroon's cocoa is slightly different from the other West African cocoa in that it has a darker, more reddish break and a more pungent flavour. It tends to be preferred by the European cocoa-pressing industry for its higher-than-average cocoa butter content. However, in December 2012, the EU rejected a shipment of 2,000 MT of Cameroonian cocoa contaminated with polycyclic aromatic hydrocarbons (PAH), and in December 2013, another 3,000 MT was rejected. Low bean quality has pushed down prices, with Cameroonian beans typically trading at a discount of 400 FCFA/kg on the international market (Ecobank, 2014). In addition to declining world prices, market prices are volatile, which further depress farmers' profitability and income (Oomes et al., 2016; CTA, 2010; Dada, 2007).

Management is the most important factor in the success of any farm operation. Profit maximization is traditionally assumed to be the overriding goal in most management decisions (Sahs, 2003). However, profit would be affected by the productivity of input, the cost of input and the price of output. Production costs differ from farm to farm depending on a number of factors. Farms also have different patterns of labour use, different equipment costs, and different aeration strategies (Engle, 2012; Woods and Isaacs, 2000). These changes make a significant impact on the structure of farm, and it thus requires that farms have accurate information about their operations, products, customers and markets in order to be competitive (Gunarathne and Samudrage, 2018).

Based on Blank (2018) and Demsetz (1973) superior firm hypotheses, differences in productivity level is the major factor behind profit heterogeneity. This was confirmed by Stierwald (2010), who found out that more productive firms are more profitable. He further explained that high earnings in the past provide an opportunity to earn high profits in the future. Therefore, an increase in profitability is important for the competitiveness and possibilities of survival of the firm. As such, it is necessary to perform profit and profitability analysis regardless of whether the firm is profitable or not. This, according to Tamulevičienė (2016), is because a constant and detailed analysis of profitability is an important source of its increase. The productivity of Cameroon's cocoa is relatively very low. It produces only about 300 to 400 kg/ha of dried cocoa beans annually (Wessel and Quist-Wessel, 2015), whereas a healthy adult cocoa tree would produce up to 2,500 kg/ha annually (Coulibaly, 2012). In addition, many studies (Muhardi et al., 2020; Ngoe et al., 2018; Ingram and Tothmihaly, 2018) have reported that aging trees is one of the reasons for low productivity of cocoa.

According to Nalley et al. (2013), cocoa can be productive up to 50 years, although its production peak is earlier. However, the satisfactory yields are short-termed and collapse after 25 – 35 years (Jagoret et al., 2017). Based on the differences in productivity of a farm's age, the resource use and consequently the profitability of the farm may also differ. Prior researches that have worked on cocoa profitability in Cameroon have concentrated on the technical efficiency (Nicodeme and Suqun, 2017; Gama et al., 2015; Binam et al., 2008) or on productivity of production systems (Fule and Nkwain 2016; Folefack et al., 2015). This study aimed at comparing the economic performance of different crop ages of smallholder cocoa production in other to assist in decision-making, especially when rehabilitation of cocoa farms is necessary.

METHODOLOGY

Study area

The study employed primary data obtained from the South West Region that constitutes one of Cameroon's 10 regions. Along with the North West Region, it is one of the two Anglophone regions of the nation. It is situated just above the equator and nestled along the Cameroon line of volcanoes at latitude 5.41667° and longitude 9.33333° with an altitude of 1 345m above sea level.

The South West Region has a total surface area of 25,410 km^2 (9 811 sq miles) covered by humid forests and is ecologically favourable for agriculture of various types. It is gifted with high yields of both cash crops and food crops where over 38% of its total surface area is under cultivation. Perennial crops include cocoa, palms, bananas, tea, coffee, citrus and rubber. Commonly grown food and vegetable crops include cassava, maize, yams, cocoyams, groundnuts, pepper, and plantains. Moreover, it contributes the most significant share to Cameroon's cocoa production (CAMACO, 2010).

The region is divided into six (6) Administrative Divisions of Fako, Koupé-Manengouba, Lebialem, Manyu, Meme, and Ndian (Figure 1). As of 2013, its population was about 1 481 433 with a diversity of ethnic groups: Bakundu, Bakweri, Balondo, Banyanga, Nweh, etc. However, there is a strong presence of migrants from the North West Region and Nigeria who contribute significantly to agricultural production. Over 70% of the inhabitants live in rural areas and are engaged in agriculture (Chambon and Mokoko, 2013; MINADER, 2013).

Sampling

This study utilized the multi-stage random sampling technique to collect primary data in a survey of 120 cocoa farmers using a semi-structured questionnaire. The first stage of the sampling process was a purposive selection of the four major cocoa-producing divisions given their percentage contributions to cocoa production in the Region: Meme (40%), Manyu (25%), Koupé-Manengouba (14%) and Fako (11%) (MINADER, 2007). Due to on-going Anglophone crisis, the second stage involved a random selection of one relatively "conflict-free" subdivision from each selected Division indicated on Figure 1. Then, the third stage entailed a random selection of 30 respondents from each subdivision.

Analytical framework

The study employed descriptive statistics in the form of frequencies

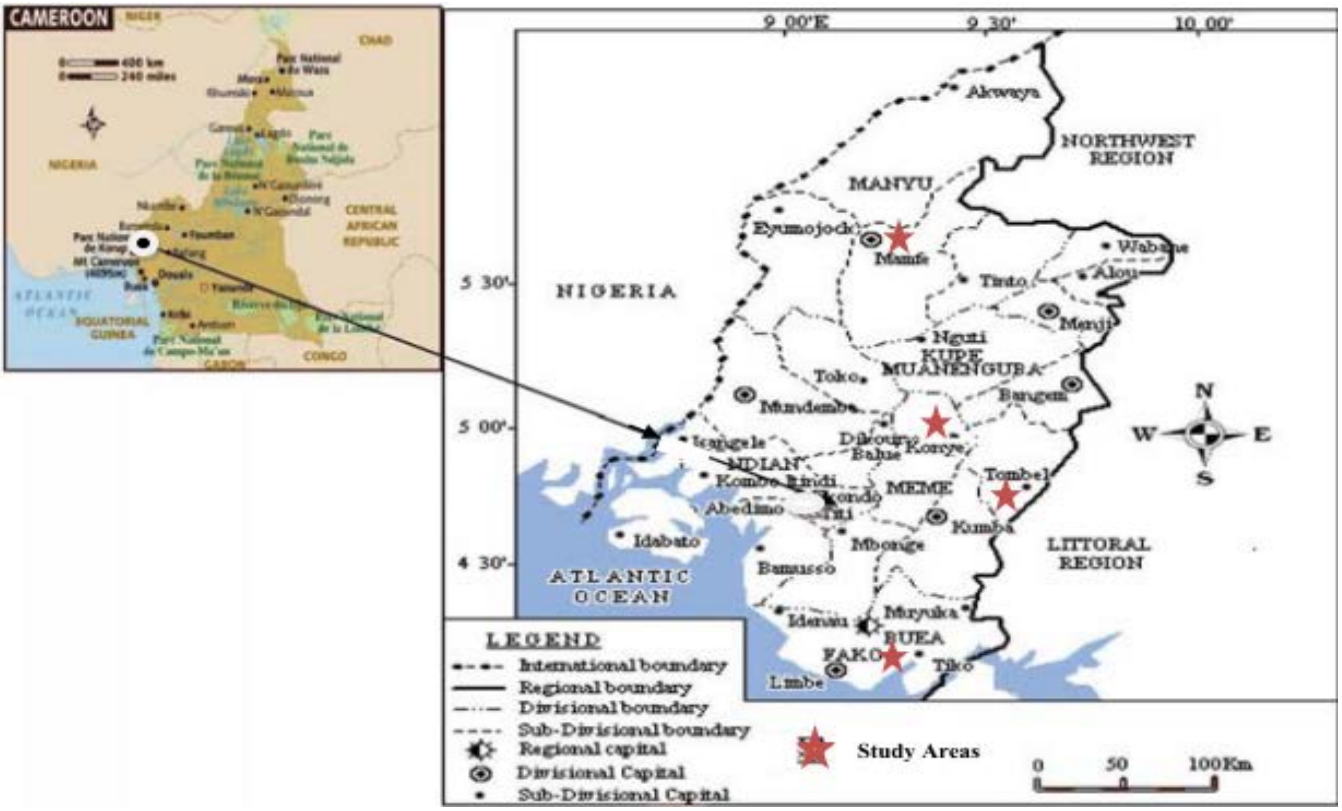

Figure 1. Map of South West Region indicating the sampled subdivision.
Source: Adaptation from Governor's Office, SWR.

and cross-tabulation to test the significance of the socio- economic variables and the budgetary analysis approach (gross margin) to compute the profitability. Budgeting is the most widely adopted non-stochastic approach for evaluating profitability due to its simplicity. More specifically, an enterprise budget illustrates the expected costs and returns, inputs and production, and timing for a particular farming activity (Sahs, 2003). This method amounts to calculating profitability indicators, which are used to compare profitability across time or similar firms (Fonsah et al., 2018).

Model specification on budgetary analysis

The farm budgeting model was specified as follows:

Net farm income: NFI = TR - TVC – TFC or TR-TC

Implies,

TC = TVC + TFC

However,

Gross margin: GM = TR-TVC

Therefore,

NFI = GM – TFC

Economic Efficiency (Return on Investment): EE (ROI) = NFI /TC

Benefit Cost Ratio: BCR = TR /TC

Net Profit Margin: NPM = NFI/TR

Economic Structure Ratio: ESR = FC/VC

Returns of Variable cost: RVC = TR-TFC/TVC

Returns of Fixed cost: RFC = TR-TVC/TFC

Where: GM, gross margin; TFC, total fixed cost; TVC, total variable cost; TC, total cost; and TR, total revenue.

RESULTS AND DISCUSSION

Socio-economic analysis

Table 1 presents the result of the socio-economic characteristics of the respondents. The result revealed that cocoa production is male-dominated as 89.2% of the respondents were men. A similar finding was reported by Tchokote et al. (2015) in Lekie Division of Cameroon, who found out that 86.3% of the cocoa producers were

Table 1. Descriptive statistics on the socio-economic variable of respondent.

Variable	Label	Percentage (Frequency)				Sig χ^2
		Pooled	<10	10-30	>30	
Crop Age			4.2 (5)	40.8 (49)	55.0 (66)	
Sex	Male	89.2 (107)	4.7 (5)	41.1 (44)	54.2 (58)	0.690
	Female	10.8 (13)	0.0 (0)	38.5 (5)	61.5 (8)	
Age	<30	25.0 (30)	0.0 (0)	43.3 (13)	56.7 (17)	0.575
	31-45	36.7 (44)	9.1 (4)	38.6 (17)	52.3 (23)	
	45-65	33.3 (40)	2.5 (1)	42.5 (17)	55.0 (22)	
	>65	5.0 (6)	0.0 (0)	33.3 (2)	66.7 (4)	
Education	No Formal	23.3 (28)	0.0 (0)	42.9 (12)	57.1 (16)	0.385
	Primary	53.3 (64)	4.7 (3)	35.9 (23)	59.4 (38)	
	Secondary	19.2 (23)	4.3 (1)	52.2 (12)	43.5 (10)	
	Tertiary	4.2 (5)	20.0 (1)	40.0 (2)	40.0 (2)	
Marital Status	Single	25.8 (31)	0.0 (0)	51.6 (16)	48.4 (15)	0.000
	Married	61.7 (74)	1.4 (1)	39.2 (29)	59.5 (44)	
	Divorced	2.5 (3)	66.7 (2)	33.3 (1)	0.0 (0)	
	Widowed	10.0 (12)	16.7 (2)	25.0 (3)	58.3 (7)	
Association Member	Yes	31.7 (38)	5.3 (2)	31.6 (12)	63.2 (24)	0.368
	No	68.3 (82)	3.7 (3)	45.1 (37)	51.2 (42)	
Extension Visit	Yes	8.3 (10)	0.0 (0)	60.0 (6)	40.0 (4)	0.390
	No	91.7 (110)	4.5 (5)	39.1 (43)	56.4 (62)	
Land Ownership	Own	37.5 (45)	11.1 (5)	42.2 (19)	46.7 (21)	0.010
	Lease	62.5 (75)	0.0 (0)	40.0 (30)	60.0 (45)	

Source: Computed from Survey Data (2018).

men, confirming the statement of Rwelamira (1999) that African women are considered to be producers of food crops while their male counterparts concentrate on cash crop and livestock production. Also, affirmed by the result is the statement of Mukete et al. (2016) that smallholder farmers are limited in their access to resources as; 62.5% of these respondents do not own the land they farm on, 91.7% lack access to extension services, 76.6% have less than elementary education, and 68.3% do not belong to a producer association. However, the majority of them (71.7%) are younger than 45 years, putting the farmers at a productive age, and 61.7% of them are married, a factor supporting family responsibility. Also, the result revealed that most of the farmers (55%) have crops older than 30 years; a factor many researchers reported as a limiting factor to cocoa productivity and only 4.2% of farms with trees aged between 0-10. However, this finding is contrary to that of Kongor et al. (2018), who found only 8.5% of the farmers having cocoa trees older than 30 years, 26.8% between 0-10 years and the majority 43.2% between 11-20 years. Compare to Cameroon, Ghana's cocoa trees are younger, which may be one of the reasons why production of cocoa in Ghana more than tripled from 293000 in 1990/1991 to 897000 in 2013/2014 production year, while that of Cameroon remain steadier from 115000 to 211000 within the same production years (Hütz-Adams et al., 2016).

Land ownership and marital status were the two factors that showed significant association with the age group of a cocoa farm. Land is fundamental for agricultural production. Its access influences investment into productive activities, while its ownership encourages the practice of sustainable use of resources (Gyau et al., 2014). This statement could justify why none of the

farmers who are leasing their farms have crops less than 10 years old while 60% of them have crops older than 30 years, indicating disinterest in replanting. In terms of marital status, divorcees have the highest percentage (66.7%) of crops younger than 10 years, which could be an indication of starting-off after a divorce. The married and the widowed have their highest percentages with crops older than 30 years (59.5% and 58.3% respectively).

Profitability

Profitability is the main objective for most firms and a factor for sustainability on every production system. Presented in Table 2, are the costs and returns, which were used to determine the profitability and the cost structures of per hectare production of cocoa in the South West Region of Cameroon. Profitability is an essential tool for decision-making on investment. At the same time, the cost structure helps investors in better planning by providing insight into which input constitutes the larger proportion of the total cost of production (Kulyakwave et al., 2020; Bekele et al., 2019). From the result, labour is the most costly input. It accounts for 39.1% of the total cost of production. This indicates that cocoa production is a labour-intensive production system. The implication of this is that labour efficiency will result in an increase in the profitability of cocoa production. Fungicide is the second costly input, which according to Wessel and Quist-Wessel (2015), may be due to its frequent application to control “Black pod” disease, which is very prominent due to heavy rains in the production cycle. “Bag weight,” a levy deducted from farmers by marketing agents to account for cocoa quality, represents 4.2% of the total cost. This is an unnecessary cost that can be eliminated, if these farmers are encouraged to grade their produce. Variable cost constitutes 75.9% of all costs indicating cocoa production in the Southwest Region is still traditional.

From the results in Table 2, the NFI of producing a hectare of cocoa overall is 79,485 FCFA. This indicated that, on average, based on the level of net farm income, the farmers were able to obtain 79,485 FCFA profit after covering all their expenses. Profitability was further highlighted by the BCR (1.3662) being greater than 1 and a positive Net Profit Margin (NPM) (0.2680). A BCR greater than 1 indicates that cocoa production in the area is profitable while the NPM value indicates that for every 1 FCFA earn, 0.27 FCFA is retained as net profit. This is in line with Yahaya et al. (2015) and Onoja et al. (2012) who stated that cocoa production is a profitable business.

Also, all crop age groups are profitable. However, crops aged < 10 years (121,235 FCFA) and 10 - 30 years (118,021 FCFA) are more than 2.5 times more profitable than the crops aged > 30 years (43,282 FCFA). Although the age group < 10 years have the highest NFI, the age group 10 - 30 outperformed the other groups based on all the profitability ratios. This indicates that the farms with cropped age 10 - 30 years are more profitable.

In terms of the cost structure, labour was the most costly item, followed by fungicide. The value for ROI (0.3662) implies that a farmer earns 36.62 FCFA profit on every 1 FCFA invested in cocoa production. It is an indication of the efficiency of the production process. Comparing the RVC (1.4860) which means every 1 FCFA invested on variable inputs, 1.4860 FCFA generates to 2.4844 FCFA obtained for RFC. This indicates that every 1 FCFA invested on fixed input generates 2.4844 FCFA, implying that to increase the profitability of cocoa production, a little more effort of increasing the efficient use of variable inputs is required.

Conclusion

Cocoa production in the South West Region is a profitable enterprise. It is dominated by male farmers on a typically traditional production system with limited access to resources and aging farms. The system is labour-intensive with high use of fungicide. Increasing profitability will mostly rely on the increase in the efficiency of variable inputs. Farms with crops age group between 10 - 30 years are better performing with better BCR, higher NPM and higher ROI. It is recommended that rehabilitation of farms for better sustainability should be considered only after 30 years of production.

Policy issues to increase women’s participation in cocoa farming are necessary because it is universally accepted that empowering women indicates empowering the nation. Also, increasing access to production resources especially factors that will increase efficiency on labour and fungicide use may improve the profitability of cocoa production.

This study did not take into consideration the effect of quality on the profitability of the farms. However, it was noticed that most farmers were willing to be levied for “bag weight,” compensation for cocoa bean quality. It will be necessary to assess the effect of quality on profitability.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Table 2. Costs and returns on per hectare production.

Description	Crop age group (years)							
	< 10	10 – 30	> 30	Pooled	< 10	10 – 30	> 30	Pooled
	(FCFA)							
Total revenue (TR)	367 981	339 707	254 132	296 567				
Labour wage	98 775	86 084	83 097	84 949	40.0	38.83	39.44	39.13
Chemical Cost:								
-Fungicide	36 817	46 427	45 095	45 306	14.9	20.94	21.39	20.87
-Insecticide	6 610	4 843	4 929	4 955	2.7	2.18	2.337	2.28
-Herbicide	1 875	2 785	2 172	2 392	0.008	1.26	1.03	1.10
-Fertilizer	0	367	315	323	0	0.66	0.15	0.15
Levy (“bag-weight”)	7 355	8 988	9 161	9 107	2.9	4.05	4.34	4.19
Oven charge	8 723	9 185	6 747	7 905	3.5	4.14	3.2	3.64
Transportation cost	12 646	7 595	7 180	7 684	5.1	5.13	3.41	3.54
Marketing cost	1 455	856	910	914	0.59	0.39	0.43	0.42
Total variable Cost(TVC)	174 256	167 130	159 606	163 535	70.6	75.3	75.7	75.3
Gross margin (GM)	193 725	172 577	94 526	133 032				
Land value (Rent)	57 846	44 424	42 750	44 128	0.234	0.200	0.203	0.203
Depreciation of other fixed asset	14 644	10 132	8 494	9 419	0.059	0.046	0.0403	0.043
Total fixed cost (TFC)	72 490	54 556	51 244	53 547	0.293	0.246	0.243	0.247
Total cost (TC)	246 746	221 686	210 850	217 082				
Net farm income (NFI)	121 235	118 021	43 282	79 485				
Benefit cost ratio (BCR)	1.4913	1.5324	1.2053	1.3662				
Net profit margin (NPM)	0.3295	0.3474	0.1703	0.2680				
Return on investment (ROI)	0.4913	0.532	0.2053	0.3662				
Returns of variable cost (RVC)	1.6957	1.70616	1.2712	1.48603				
Returns of fixed cost (RFC)	2.6724	3.1633	1.845	2.4844				
Economic structure ratio (ESR)	0.416	0.326	0.321					
Std. Error Mean	25 465.751							
T – value	3.698							
Sig. (2-tailed)	0.066*							

* implies significance at 10% (p<0.10).
Source: Computed from Survey Data (2018).

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