Pelita Perkebunan 36 (2) 2020, 190–202 ISSN: 0215-0212 / e-ISSN: 2406-9574

Impact of Personal Characteristics of Farmers on Cocoa Yields: Case of Centre Region, Mbangassina Municipality, Cameroon

Herve Bertrand Yakan[1*)], Ehabe Eugene[2)], and Vanisa Yenwo Nonzienwo[3)]

[1)]Socio-Economics Research Programme, Multipurpose Agricultural Research Stattion Nko'olong, Institute of Agricultural Research for Development Cameroon (IRAD), P.O. Box 219, Kribi, Cameroon
[2)]Department of Scientific Research, Institute of Agricultural Research for Development Cameroon (IRAD). P.O. Box. 2123, Yaoundé, Cameroon
[3)]Faculty of Economics and Management, University of Yaounde II, P.O. Box 18, Soa, Cameroon
[*)]Corresponing author: yakanhervebertrand@yahoo.fr
Received: 2 April 2019 / Accepted: 20 May 2020

Abstract

Cameroon is the fifth largest cocoa producer in the world with approximately 220,000 tons of cocoa produced annually. Many factors account for this productivity, amongst which are ageing farms and personal characteristics of farmers. The study follows a hypothetico-deductive methodology through which a random sampling technique was adopted and relevant primary data was gathered with the aid of a structured questionnaire administered to 150 cocoa farmers from 5 villages; Talba, Biakoa, Goura II, Mbangassina, and Bilomo. Correlation analysis and ordinary least squares regression were used to examine the relationship and effects between socio-economic variables and cocoa yields. Findings showed a positive correlation between the socio-economic variables and cocoa yields, socio-economic factors such as experience in cocoa farming, number of farms, source of labour, farm size, income were statistically significant at p = 1%, 5%, and 10%. Personal characteristics such as farm size, farming experience, percentage of income from cocoa farming, source of labour, number of farms per cocoa farmer, and cocoa price had a significant impact on cocoa yields. However, personal characteristics such as age, sex, marital status and household size did not show any significant impact on cocoa yields. Thus, professionalizing cocoa farmers and training of farmers in good cocoa business practices can go a long way to improve cocoa productivity.

Keywords: Cocoa, socio-economic characteristics, cocoa yields, youths

INTRODUCTION

Cocoa (*Theobroma cacao*) is one of the most important cash crops cultivated throughout the humid tropics of West Africa, South-east Asia, South America and the Caribbean, but majority of the world's cocoa comes from the West Africa (Ruf & Schroth, 2004). Cocoa is one of the major foreign exchange earners for some countries in Africa such as Ghana, Cote D'ivore, Nigeria, and Cameroon (Nkamleu *et al*., 2010). This crop is a major driver of land-use change, covering over five million of hectares of land (Ruf & Schroth, 2004). Within West Africa, cocoa production has for the past 100 years been the leading export of the region (Sonwa *et al*. 2001) and accounts for about 74% of total household income (FTI, 2018).

Cocoa represents about 7% of the nation's agricultural GDP (FAO, 2014), accounts for

around 6% of Cameroon's exports, and is of crucial importance to the State (Bisseleua & Kidal, 2007) since she receives more than 250 billion FCFA (309 million pounds) a year from cocoa accounting for about half of the primary sector exports (Ngoe *et al*., 2016; Tabi *et al*., 2017). The major cocoa producing areas of Cameroon are located in the South-west regions (31.54% of total production), Centre (50.36%), South (4.99%), Littoral (6.98%) and the East-west, North-west regions account for the remaining 6.12% (Lescuyer *et al.*, 2019).

It is noteworthy that although Cameroon is one of the top producers of cocoa in the world, yields continuously remains low averaging 300kg/ha on average compared to Cote D'Ivoire, Ghana, Indonesia, and Nigeria (GCLP, 2019). The cocoa sector in Cameroon depends on a lot of natural elements to favour its production and productivity. Climatic factors such as rainfall, temperature, sunshine, humidity, soil moisture and wind affect cocoa production. According to Wessel & Quist-Wessel (2015), cocoa producing countries in West Africa have common causes of low yield which includes: low input use, inadequate maintenance, pest and disease control, poor shade management, little or no fertilizer use and old age of cocoa farms. The farm gate cocoa price, high input prices, no access to loans or credits and the small farm size are considered as external factors beyond the control of an individual farmer. They affect the general conditions for cocoa production but have no direct effect on yield. Direct effects have the constraints and options for higher yields which operate within the cropping system. These factors are both physical and socioeconomic factors.

In the South-west region most cocoa trees are the aged trees (that is 40% of cocoa trees were planted before 1960), poor farm maintenance practices, planting of low yielding varieties, ravages caused by pests such as mirids (*Salhbergella singularis* H.) account for low productivity per hectare. In the central region of Cameroon, about 80% of cocoa plantations are over 40 years old and farmers manage to obtain cocoa yields using the technical model that is proposed to farmers which gives priorities to the intensive management of cocoa as a single crop or with light shades (Jagoret *et al*., 2011).

Personal characteristics of farmers have been advanced as one of the major factors that can affect cocoa productivity. Studies on the socioeconomic and personal characteristics of cocoa farmers have been reported from many cocoa-growing areas (Bisseleua *et al*., 2013; Vaast & Somarriba, 2014; Oluyole & Sanusi, 2009). Cocoa feeds, cloths, shelters and takes care of the livelihood of the farmers (Ngoong & Forgha, 2013). However, there is a dearth of knowledge about differences in personal characteristics and cocoa yield or productivity of cocoa farmers in cocoa growing areas in Cameroon especially in Mbangassina municipality. Up-to-date and accurate knowledge of the personal profile of cocoa farmers is necessary for sustainable cocoa production (Aneani *et al*., 2012) hence an improved understanding of this relationship between the personal characteristics of cocoa farmers and yields is important. The objective of this study was to determine the impact of personal characteristics of farmers on cocoa productivity in the centre region.

MATERIALS AND METHODS

Study Area

The municipality of Mbangassina was created by presidential decree n ° 93/321/ PR of November 25, 1993, it is located in the centre region, department of Mbam and

Kim and is made up of 19 villages. The municipality of Mbangassina covers a total surface area of about 815 km². It is located on both banks of the Mbam river with an area of 638 km² and 120 km from Yaoundé. The municipality is bordered to the north by the municipality of Ngoro, in the south by Sa'a, in the east by Ntui and in the west by the municipalities of Ombessa, Bafia and Bokito. The municipality of Mbangassina in general, has a slightly uneven relief consisting of a succession of hills and plateaux for the most part (PCD, 2015). These are linked by sedimentary rivers in which some marshy areas exist. The rest of the municipality is made up of vast plains and small valleys and large hills of up to 526 m asl. (Montama I, II, III) which are currently occupied by populations in search for new fertile land. A socio-ecological system that consists of natural and/or human modified ecosystems, and which is influenced by distinct ecological, historical, economic and sociocultural processes and activities (PCD, 2015).

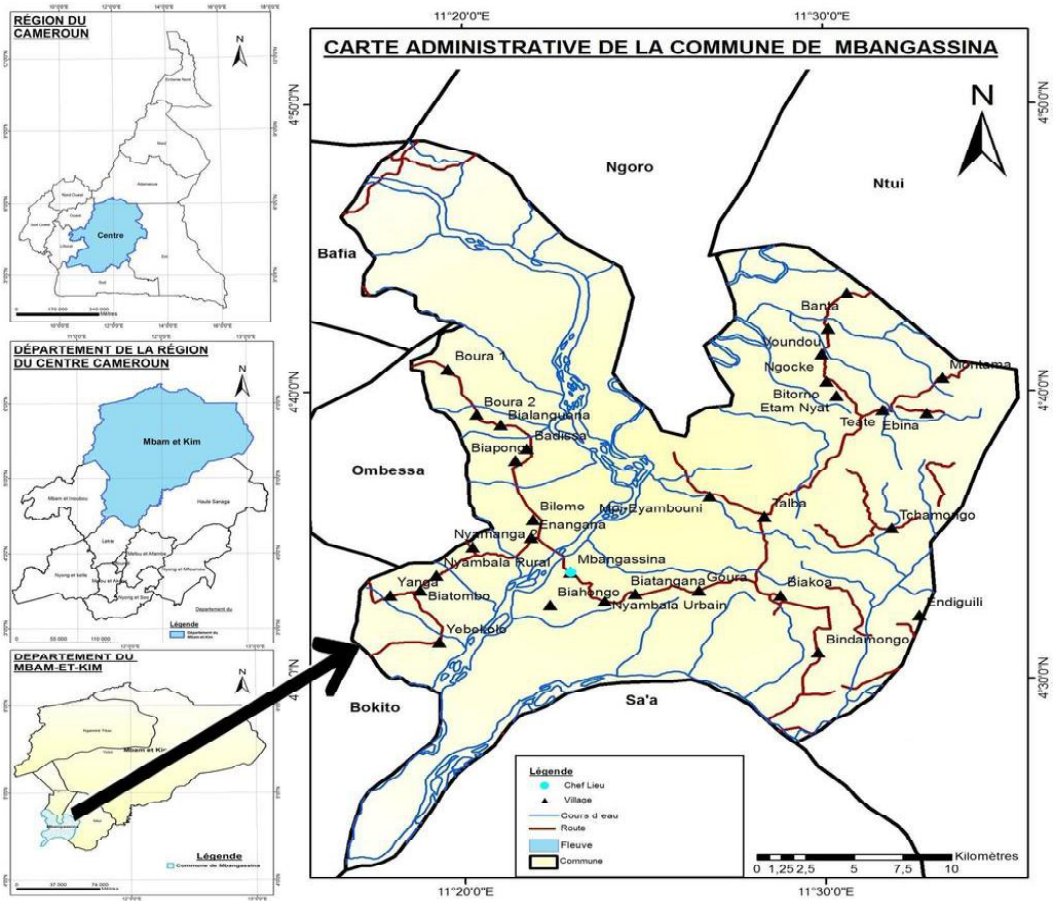

Figure 1. Map of Mbangassina municipality

Communities were selected randomly while respondents chosen purposively. Random sampling of Zhen *et al.* (2006) was used to select communities because the reconnaissance survey identified all seven sub-groups was randomly select. Report that both random and purposive sampling can be combined to produce a good method of sampling. Also in a successful research conducted by Zhen *et al.* (2006), they purposively chose respondents in randomly selected communities to which they administered questionnaires. A total of 5 villages were sampled in the Mbangassina municipality, these villages include; Talba, Biakoa, Bilomo, Goura II, and Mbangassina. Table below shows the distribution of the sampled population.

Table 1. Stratified sampling technique

Village	n = Number of respondents
Talbe	30
Biakoa	30
Bilomo	20
Goura II	30
Mbangassina	40
Total	150

Data Collection and Analysis

Data was obtained from two main sources, these were primary and secondary. Primary sources are original sources from which the researcher directly collects data that have not been previously collected whiles secondary sources are sources containing data collected and compiled for another purpose (Babbie, 1992). Primary data collection was done with the use of a questionnaire which is a research instrument consisting of a series of questions for the purpose of gathering statistically useful information from respondents (Gillham, 2008). A semi-structured questionnaire was designed as an instrument to collect data for the field work. The questionnaire consisted both open-ended and closed ended questions (le Compte *et al.*, 1992). This design was selected because it facilitates the collection of a wide range of information than a structured questionnaire and can also be used for describing a large sample, making it possible to ask many questions on a given topic (Leung, 2001). Pre-testing of questionnaire was conducted to ensure its feasibility and applicability on the field. Pre-testing of a questionnaire generally means administering a questionnaire to respondents selected from the target population using the procedures that are planned for the main study (Fowler, 1993). The reliability of information was verified with the key informants such as chiefs, agriculture extension workers, forestry officials, and some farmers in the district. The questionnaire was administered to cocoa farmers in the selected villages over a period of two weeks.

The data collected from the respondents include the socio-economic variables such as age, sex, marital status, educational level; the size of their cocoa farms; age of the cocoa farm, land preparation, income experience in cocoa farming, source of labour, as well as their cocoa yields. Descriptive statistics was used to analyze the socio-economic variables of the respondents, correlation analysis was used to bring out the relationship that exist between the socioeconomic variables and cocoa yield while regression analysis was used to analyze the effect of the socio-economic variables of the respondents on the level of cocoa yield. The descriptive statistics was used to summarize the socio-economic characteristics of the farmers as measures of central tendency (frequency and percentages) while regression model of a simple linear regression was used to estimate the socio economic and personal factors of cocoa yield in the study area. Correlation analyses will be used to determine relationship of independent variables with the dependent variable. STATA software package version 14 was used.

RESULTS AND DISCUSIONS

Socio-Economic Characteristics

Most of the farmers interviewed were within the age range of 15 to 30 years, 31 to 50 years and more than 50 years. The breakdown showed that 19% were below thirty years (15 to 30 years), 40% were between 31 to 50 years while the other of the farmers (40%) were from 51 years and above. More so from the results shown in Figure 1 we realize that, as the age increases, the number of people who get involved in cocoa farming also increases. This is in line with the assertion of Nzounankeu & Bate (2014) who asserted that the average age of a farmer in Cameroon ranges from 63 to 70 years depending on the region. This implies that the younger ones are less involved in village cocoa farming, a characteristic feature of the nonchalant attitude of youths especially in developing countries.

This usually lead to underutilization of resources and hence poverty and poor livelihood in rural Africa and also because of the fact that young people today believe that success can only be achieved when working in an office.

Figure 3 shows that 98% of the cocoa farmers are male whereas only 2% percent of the respondance are female, therefore, we realize that women not either directly involved in cocoa farming in Mbangassina municipality. This is attributed to the fact that, both male and female have unequal access to essentials such as land ownership that will allow women to engage in cocoa farming and increase yields of output. Women can only get involved in cocoa farming through inheritance from their late husbands. Some go into partnership with men where the gain is being divided 50:50 ratio. However both male and female reported that the results they get from cocoa farming business are used to purchase household food items,

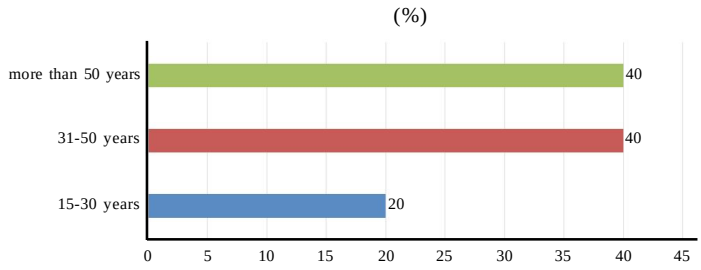

Figure 2. Distribution by age

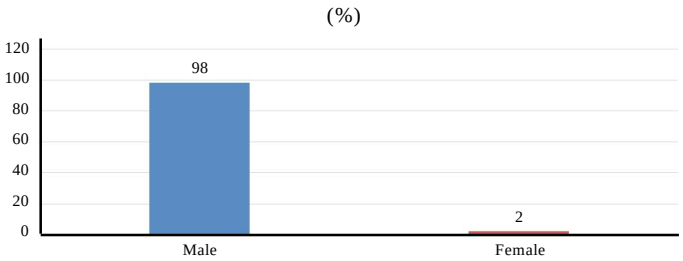

Figure 3. Distribution by sex

medical care, as well as payment of school fee for their children and relatives.

From the marital status of the cocoa farmers, 63% of the cocoa farmers are married people (Figure 4), this is justified by the fact that since cocoa production is their principal activities and their main source of income, their practice of cocoa farming will help them earn money in order to meet up with their family needs. From the field studies, respondents explained that the income they have from cocoa production goes to take care of their family needs and little is use to buy inputs for farm maintenance and thus a drop in the yields of cocoa.

The educational levels of the respondents showed that majority of the people in the area are educated. Sixty-seven percent of the village cocoa farmers had at least secondary education, 31% have had primary education and only two percent had no formal education as seen in Figure 6. We can therefore summarize that about 98% have had formal education and only two percent have had no formal education. The respondents were categorized as attempted because formal documents were not requested for during the study. However, the high percentage of those with formal education may be due to the location of the study area in which educational facilities are easily accessible. On the other hand, the situation clearly showed that people in the area and the State in general placed a high priority on education and since most of them are at least primary and secondary school leavers who could not continue with further education, joined farming as a source for their livelihood.

Figure 6 shows that majority (32%) of the cocoa farmers in the study area had farming experience ranging between 6-10 years. The relative high number of experienced farmers suggested that cocoa production is an ensuring occupation. Continuous practice of an occupation for a long period presumably makes a person more experienced and more productive in practice (Aneani, 2012) thus will be able to increase the yields.

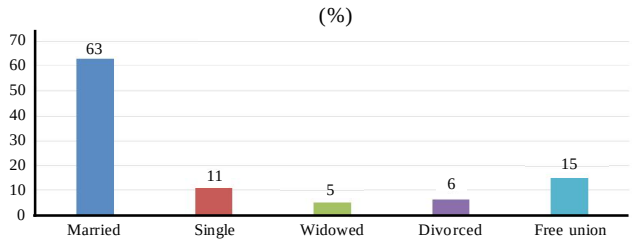

Figure 4. Distribution by marital status

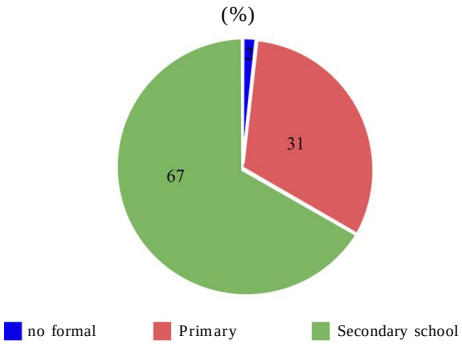

Figure 5. Distribution by level of education

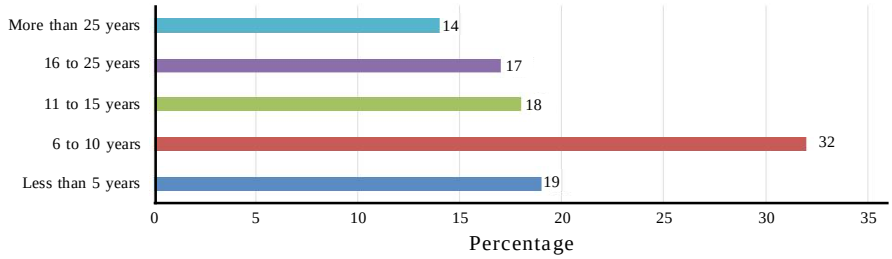

Figure 6. Experience in cocoa farming

Socio-economic Characteristics and Yield

The Pearson correlation coefficient (r) shows the degree of coefficient or the correlation between the independent variable (socioeconomic and personal characteristics) and dependent variable (cocoa yield) as shown in Table 2.

The correlation analysis above shows a weak and positive correlation between socioeconomic characteristics and yield per ha. To better appraise the impact of socio-economic characteristics on yield, the regression analysis is presented in Table 3.

To increase the production and productivity, an accurate knowledge of the socioeconomic and personal characteristics of the cocoa farmers is necessary for sustainable cocoa production (Aneani *et al.*, 2012). If these socioeconomic factors are one of the key components which need to be understood in order to increase the productivity of cocoa, then it stands to reason that stake holders, farmers and researchers should try to better understand these factors effectively.

Table 3 shows the explicative power of our regression model. The R-square shows the degree of variability of cocoa yields that is explained by socioeconomic variables. In the above model, R-square is 0.8323 meaning that the independent variables can explain 83.23 % of the variations in dependent variable (yield) while remaining could be explained by measurement errors and factors not measured in this model like weather condition, pests, diseases, soil conditions and agronomic practices. Furthermore, the adjusted R square 0.7231 indicates that 72.31% of the variance in cocoa yields is attributed to the independent variables entered into the regression. The OLS regression shows that, globally the model is significant at 1% (Prob> F = 0.0000). From this global goodness of fit statistics we can say with confidence at 1% level that our model is well suited to explain cocoa yields and the results are therefore robust.

Experience of doing any activity is important because it determines the efficiency of performing a particular task to get the intended results (Minai *et al.*, 2014). Experience in this regard was examined on the length of time during which the farmer had been in cocoa production. From the regression table, experience in cocoa farming varied significantly and positively related to amount of cocoa produced (0.0158 kg per ha). This actually implies that an increase in farm experience would increase yield by 0.0158 kg per ha since it is statistically significant at 10% (p = 0.009).

Income is significant at 1% (p-value of 0.000) indicating that farmers' income will have an impact on cocoa yields. An additional unite in income will led to an increase in yield by 0.535 kg per ha. This is as a result of the fact that the higher the income, the more the farmer increase his expenditure on input to increase his income for the next year.

Table 2. Summary of results of correlation coefficient

Variables	Correlation coefficient	Sign	Conclusion of relationship
Sex and yield per ha	0.0577	Positive	Weak Positive
Age and yield per ha	0.0782	Positive	Weak Positive
Household size and yields per ha	0.0784	Positive	Weak Positive
Marital status and yields per ha	0.0383	Positive	Weak Positive
Experience in cocoa farming and yield per ha	0.2242	Positive	Weak Positive
Percentage of income from cocoa farming and yield per ha	0.4054	Positive	Weak Positive
Source of labour and yield per ha	0.2092	Positive	Weak Positive
Number of farms per farmer and yield per ha	0.1509	Positive	Weak Positive
Age of the farm and yield per ha	0.0729	Positive	Weak Positive
Farm size and yield per ha	0.0292	Positive	Weak Positive
Income and yield per ha	0.3460	Positive	Weak Positive
Price of well treated cocoa and yield per ha	0.2484	Positive	Weak Positive

Table 3. Regression results

Source	SS	df	MS	Number of obs	=	150
Model 1	42.8082	14	1.7006	F (14, 60)	=	4.88
Residual	2.9215	60	0.3887	Prob > F	=	0.0000
Total	44.7297	74	0.6045	R – Square	=	0.8323
				Adj R-squared	=	0.7231
				Root MSE	=	0.5905

Group of variables	Dependent variable: Yield per ha	Coef.	Std. err.	T	P > |t|	95% Confidence interval	
						Lower boundary	Upper boundary
Personal factors	Sex	0.6914	0.4624	1.50	0.140	-0.2336	1.6163
	Age (yrs.)	-0.0005	0.0068	-0.08	0.939	-0.0140	0.0130
	Household size	-0.0032	0.0173	-0.19	0.852	-0.0379	0.0314
	Marital status	-0.0467	0.0602	-0.78	0.441	-0.1671	0.0738
	Income (Fcfa)	0.5351	0.1214	4.41	0.000 ***	0.2923	0.7779
Socio-economic factors	Experience in cocoa farming (yrs.)	0.0158	0.0092	1.73	0.090 *	-0.0025	0.0341
	Percentage of income from cocoa farming	0.6068	0.1200	5.06	0.000 ***	0.3668	0.8468
	Source of labour	0.2087	0.0911	2.29	0.025 **	0.0266	0.3909
	Number of farms per farmer	-0.3276	0.1078	-3.04	0.004 ***	-0.5432	-0.1120
	Age of the farm (yrs.)	0.0016	0.0047	0.34	0.731	-0.0077	0.0110
	Farm size (ha)	-0.1027	0.0316	-3.26	0.002 ***	0.1659	-0.0396
	Price of well treated cocoa per kg (Fcfa)	0.0013	0.0004	3.39	0.001 ***	0.0006	0.0021
	Land preparation	0.7660	0.3046	2.51	0.015 **	0.1568	1.3753
	Control measures against pest and diseases	0.0429	0.0712	0.60	0.549	-0.0996	0.18531
	Constant	-7.2629	2.0782	-3.49	0.001	-11.4201	-3.1058

Notes: Income = log of total income; ***Significant at 1%; ** significant at 5%; and *significant at 10%.

Farm size had a coefficient of -0.1267 with a p-value of 0.002 indicating that it is significant at 1%. The results indicate that farmers with smaller farms are more efficient in resource use hence an increase in farm size leads to a decline in cocoa yield. The results agree with the findings of Adesoji & Farinde (2006) who found out that increase in farm size decreases the yields of arable crops. According to Fule-chi (2013) an increase in farm size leads to a decline in yields. Onaiah *et al.* (2007) found that farm size significantly increased output.

More so the percentage of income from cocoa farming has a coefficient of 0.607 with a p-value of 0.000 indicating that the value is significant at 1%. This results indicate that a unite change in the percentage of income from cocoa farming will lead to an increase in the yields of cocoa by 0.607 kg per ha. Hence, it indicates that the greater the percentage of income from cocoa farming the more the farmers will invest on the buying of inputs in order to increase their yields and enjoy a greater percentage of income from cocoa farming. Apart from the percentage of income, income on itself will play a greater role in yield. We realize that, the coefficient is 0.535 while the p-value is 0.000 which indicates significance at 1%. showing that a change in income will increase yields by 0.535 kg per ha.

With respects to the source of labour, the coefficient is 0.2087 with a p-value of 0.025 indicating that it is significant at 5%. The results shows that a change in the source of labour will increase yields by 0.2087 kg per ha. From the table of the summary of the socioeconomic variables, we realized that the use of family and hired labour as a combined force will lead to an increase in yields.

Sex of the farmer is one of the socio-economic variables which might have influenced cocoa yields. From the above results, the coefficient is 0.691 while the p-value is 0.140. The finding from the above results indicates that there is no significant between sex of the farmer and yield of cocoa. This is to shows that both female and male respondents were able to produce at the same level approximately at equal proportion. This is in line with what was reported by (FAO, 2012) that in some rural societies, commercial agricultural production is mainly a male responsibility. Men usually prepare land, irrigate crops, and harvest and transport the produce to the market.

In addition, number of farms owned by each farmer is another socioeconomic value which has an effect on cocoa yields. From the results above, we have a coefficient of -0.328 with a p-value of 0.004 indicating that the value is significant at 1%. We realize that famers with less number of cocoa farms are more efficient than farmers with more cocoa farms. This is because an increase in the number of cocoa farm will cause farmers to reduce the inputs per farm thus with insufficient inputs such as number of hours allocated for each farm, rate of maintenance, etc. eventually yields will turn to reduce

Again, price of well treated cocoa is another factor which can affect yield since it varies from one cocoa farmer to another. From the results above, the coefficient of 0.0013 is related to a p-value of 0.001 indicating significance at 1%. This shows that a change in price of well treated cocoa from one farmer to another will have an effect on their yield by 0.0013 kg per ha. Farmers with higher prices tend to enjoy higher profits and increase their inputs to obtain higher yields whereas farmers with low prices will enjoy less profits and less income for reinvestment to obtain higher yields. This price variation is usually as a results of lack of collective action by farmers which is very important when it comes to price determination and asymmetry of information hence asymmetry of information on cocoa quality and market price causing farmers to be price takers; receiving low prices (Kamdem *et al.*, 2010).

Land preparation also is another factor that can affect yields in which the knowledge of the cocoa farmer with respect to the farm management techniques was rated. From the above regression, we realize that with a coefficient of 0.766 and a p-value of 0.015, indicates that a unit change in land preparation leads to an increase in yields per ha by 0.766.

This is statistically significant at 5% hence the knowledge of the cocoa farmer with respect to his farm management techniques in land preparation is one of the fundamental aspect of farm management techniques due to the fact that farmers have a good knowledge in land preparation.

Pest and disease control which is one of the most important aspect in cocoa yield has a coefficient of 0.0529 and a p-value of 0.429 indicating that it is significant at 5%. In this case we realize that a positive change in the pest and disease control will increase yields by 0.0529 kg per ha which is statistically significant at 5%. Thus the evaluation of the knowledge of the cocoa farmer with respect to his farm management techniques in pest and disease control is one of the most important aspect due to the fact that a good knowledge in the farm management techniques in pest and disease control techniques.

Although the model explains factors affecting yield fairly well (that is $R^2 = 0.5$), other more determining factors like disease prevalence, farm management (timeliness in weeding, pruning and treatment), soil fertility, amount of shade or sunlight, climate, etc. could also be included if observable.

CONCLUSIONS

The results showed that there is a significant correlation between the socioeconomic variables and cocoa yields. A number of factors are known to affect yields and may act in isolation or in combination to affect yield. There was significant relationship between socioeconomic and personal characteristics of farmers such as farm size, farming experience, percentage of income from cocoa farming, source of labour, number of farms per cocoa farmer, price of the with cocoa productivity. Other socioeconomic factors such as percentage of income from cocoa farming, source of labour, number of farms by each farmer, income, price of well treated cocoa per kg, land preparation show statistical significance with cocoa yields with all the factors showing a positive relationship with yields except for land preparation which has a negative relationship with cocoa yields. Personal characteristics such as age, sex, marital status, household size, and other socioeconomic variables like age of the farm, farmer's knowledge in the control of pest and disease did not affect significantly to cocoa yield but showed a relationship with cocoa yields except for knowledge in pest and disease control. The overall conclusion from this study is that there is need to better master the socioeconomic characteristics of cocoa farmers to better taylor programs that will meet their aspirations. This is because yields is an important aspect when it comes to measuring the performance of cocoa producers, thus bringing out the socioeconomic and personal characteristics and examing their influence on yields, will be a good aspects for policy makers to handle in order to increase the yields of cocoa.

REFERENCES

Adesoji, S. & A. Farinde (2006). Socio-economic factors influencing yield of arable crops in Osun State, Nigeria. *Asian Journal Plant Science,* 5, 630–636.

Aneani, F.; V.M. Anchirinah; F. Owusu-Ansah & M. Asamoah (2012). Adoption of some cocoa production technologies by cocoa farmers in Ghana. *Sustainable Agriculture Research*, 1, 103–117.

Babbie, E.R. (1992). *The Practice of Social Research* (6th ed.). Wadsworth Publishing. California.

Bisseleua, H.; D. Fotio; M. Yede & S. Vidal (2013). Shade tree diversity, cocoa pest damage, yield compensating inputs and farmer "Net Returns in West Africa". PLOS ONE, 8, e56115.

Bisseleua, D.H.B. & S. Vidal (2007). Plant biodiversity and vegetation structure in traditional cocoa forest gardens in southern Cameroon under different management. *Biodiversity and Conservation*, 17, 1821–1835.

FAO (2014). *Smallholder Data Portrait, Food and Agricultural Organizzation*. Rome.

Fowler, H.G. (1993). Use of fallen cocoa pods by ants (Hymenoptera: Formicidae) in Southeastern Brazil. *Journal of the Kansas Entomological Society*, 66, 444–446.

FTI (2018). *Annual Report and Financial Statement*. Fair Trade International. Fairtrade Foundation, UK.

Fule, C.B. (2013). *Small-Scale Versus Large-Scale Cocoa Farming in Cameroon: Which Farm Type is More Ready for The Future*? Master thesis. European Erasmus Mundus Master Program: Agricultural Food and Environmental Policy Analysis Program. Swedish University of Agricultural Sciences. Uppsala, Swedish.

GCLP (2019). *Green Cocoa Landscape Program-Project Idea Note-Grand Mbam Landscape (Pilot Municipality: Mbangassina)*. WWF and IDH. Amsterdam, Nertherland.

Gillham, B. (2008). *Developing a Questionnaire* (2nd edition). London & New York: Continuum International Publishing Group. London, UK.

Jagoret, P.; I. Michel-Dounias & E. Malézieux (2011). Long-term dynamics of cocoa agroforests: A case study in central Cameroon. *Agroforestry Systems*, 81, 267–278.

Kamdem, C.B.; F. Galtier; J. Gockowski; D.B. Helene; J. Egg & B.K. Dia (2010). What determines the price received by cocoa farmers in Cameroon? An empirical analysis based on bargaining theory. *African Jurnal of Agricultural Resources and Economy*, 6, 318–339.

LeCompte, M.; J. Preissle & W. Milroy (Eds.) (1992). *The Handbook of Qualitative Research in Education*. Academic Press. New York.

Lescuyer, G.; S. Bassanaga; L. Boutinot & P. Goglio (2020). Analyse de la chaîne de valeur du cacao au Cameroun. Rapport pour l'Union Européenne, DG DEVCO. Value Chain Analysis for Development Project (VCA4D CTR 2016/375–804).

Leung, W. (2001). How to design a question nare. *Student BHJ*, 9, 187–189.

Ngoe, M.; Z. Jing; B. Mukete; G. Tabi; J. Kimengsi & D. Aniah (2016). Analysis of the technical efficiency of smallholder cocoa farmers in south west Cameroon. *American Journal of Rural Development*, 4, 129–133.

Ngoong, J.T. & N.G. Forgha (2013). An analysis of the socio-economic determinants of cocoa production in Meme Division, Cameroon. *Greener Journal of Business and Management*, 3, 298–308.

Nzouankeu, A.M. & F. Bate (2014). Ageing farmers, low-yield crops hurt Cameroon's cocoa ambitions. *Business Insider Reuters*. Yaounde, Cameroon.

Oluyale, K.A.; R.A. Samusi (2009). Socio-economic variables and cocoa production in Cross River State Nigeria. *Human Ecology*, 25, 5–8.

Onaiah, M.O.; V.E. Enya; O.A. Agba & S.O. Oday (2007). Analysis of the effects of farm size, labour, and capital resources on sweet potato output in the Central and Northern Senatorial Districts of Cross River State. *Journal of Agriculture, Forestry and the Social Sciences*, Vol. 5, No. 1 (2007).

PCD (2015). *Plan Communal de Development de Mbangassina*. Mbangassina Municipality.

Ruf, F. & G. Schroth (2004). Chocolate forests and monocultures: a historical review of cocoa growing and its conflicting role in tropical deforestation and forest conservation. p. 107–134. ***In:*** *Agroforestry and Biodiversity Conservation in Tropical Landscapes*. (G. Schroth; G.A.B. da Fonseca; C.A. Harvey; C. Gascon; H.L. Vasconcelos;

A.M.N. Izac, Eds.). Island Press, Washington, D.C.

Sonwa, D.J.; S.F. Weise; M. Tehatat; B.A. Kongmeneck; A.A. Adesina; O. Ndoye & J. Gockowski (2001). The role of cocoa agroforests in rural and community forestry in Southern Cameroon. *Rural Development Forerstry Network Paper,* 25g, 1–10.

Tabi, G.; Q. Su & M. Ngoe (2017). The economic analysis of resource used efficiency for cocoa production in Cameroon: The case study of Lekie Division. *American Journal of Rural Development*, 5, 123–137.

Vaast, P. & E. Somariba (2014). Trade offs between crop intensification and ecosystem service: The role of agroforestry in cocoa cultivation. *Agroforestry System*, 88, 947–956.

Wessel, M. & P.M.F. Quist-Wessel (2015). Cocoa production in West Africa, a review and analysis of recent developments, *NJAS-Wageningen Journal of Life Sciences*, 74–75, 1–7.

Zhen, L.; M.A. Zoebisch; G. Chen & Z. Feng (2006). Sustainability of farmers' soil fertility management practices: A case study in the North China Plain. *Journal of Environmental Management*, 79, 409–419.