

COMPARATIVE ANALYSIS OF USERS AND NON-USERS OF TECHNOSERVE FACILITIES IN COCOA PRODUCTION IN EKITI STATE NIGERIA

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Abstract

The study examined the socio-economic characteristics of users and non-users of Technical Support Services (TECHNOSERVE) facilities among cocoa farmers; estimated the costs and returns of the users and non-users of TECHNOSERVE facilities and also the effects of TECHNOSERVE facility on cocoa production among users in the study area. These were with a view to assess the contribution of Technoserve – BOA (Bank of Agriculture) facilities in production and marketing of cocoa in Ekiti State, Nigeria. The study area was Ekiti State and a multi-stage sampling technique was employed in selecting the respondents. The sampling techniques enables the study to select 240 respondents in the final enumeration used for data analysis. Descriptive statistics, budgeting technique and multiple regression analysis were used to analyze the data. The result of descriptive statistics revealed that the mean age of users and non-users farmers were 44 ± 9.78 and 48 ± 12.70 years respectively, most (i.e. 94% of users and 85% of non-users) of the respondents were male, majority (95%) of the cocoa farmers were married, while majority of both the users and non-users had household size between 6 and 10. Most of the respondents (62% users and 49% non-users) had secondary education while 63% of the users and 77% of the non-users had farming as their primary occupation. The mean year of experience of users was 18.74 ± 11.06 while non-users had 22.43 ± 12.43 years of experience; the mean value of land allocated to cocoa production by users was 6.08 ± 3.71 while that of non-users was 6.55 ± 3.89 . Budgetary analysis result showed that, the mean value of total variable cost and total fixed cost of both users and non-users were ₦140,348.63, ₦40,252.85 and ₦95,978.33, ₦33,233.86 respectively. Mean value of the total revenue for both users and non-users were ₦276,562.77 and ₦171,619.47 while their Net Farm Income were ₦95,961.29 and ₦42,407.28 respectively. The gross margin equals ₦136,214.14 for users and ₦75,641.14 for non-users. This indicates that the enterprise is more profitable with the use of Technoserve facilities. The result from the regression model shows that all the independent variables had positive relationship with net income of the respondents except quantity of insecticide used by the respondents while quantity of fungicide, number of seedlings and quantity of herbicide used were in conformity with a priori expectation. This study observed that the enterprise is comparatively more productive for the users of Technoserve facilities. Farmers in the study area could improve their net income through the use of Technoserve facilities.

Keywords: Proportional analysis, Techno serve services, Cocoa production, Ekiti state

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Introduction

In West Africa, agriculture has continued to play a dominant role in the provision of food, raw materials for industries, employment for the majority of the populace, and foreign exchange used in financing development activities. Permanent crops otherwise known as perennial tree crops are long term crops that occupy the field planted for a long period of time and largely harvested every year and do not have to be replanted for several years after each harvest. In the last 40 years, permanent crops, notably cocoa, coffee, oil palm, and rubber, have dominated the export agriculture (Nkamleu *et al.*, 2010).

Perennial tree crop systems in Africa are important for national macroeconomic balances and rural livelihoods. Among the perennial tree crops, cocoa (*Theobroma cacao L.*) is of particular interest for West and Central Africa from where approximately 70% of the world supply of cocoa originates and for the global chocolate industry (Nkamleu and Kielland, 2006). Cocoa is grown on about 7.2 million hectares with major concentrations in West Africa, South East Asia and Latin America. Cocoa is one of the most widely produced agricultural cash crops in the West African countries. It is a vital source of foreign exchange, investment, and economic growth. The cocoa proportion of the agro forest ecology in Cameroon, Nigeria, Ghana and Cote d'Ivoire account for over 2 million Metric tons which represents 70% of world supplies. Cocoa production raises over \$2 billion in foreign exchange for the sub region and taxation of the sector generates significant government revenues. With average country yields between 300 kg and 400kg per hectare (ha), approximately 7 million hectares of land is devoted to cocoa production in these countries farmed by approximately 2 million households (Vos *et al.*, 2002).

Specifically, cocoa production is dominated by four countries; Côte d'Ivoire and Ghana produce approximately 41% and 17% of the world output respectively. The other two important producers are Cameroon and Nigeria, each contributing approximately five percent of the world cocoa production (Nkamleu *et al.*, 2010). The Nigerian cocoa economy has a rich history which is well documented in literature. The contributions of cocoa to the nation's economic development are vast and have been reported by many authors (Olayide, 1969; Folayan *et al.*, 2006). Cocoa has been the main agricultural export of Nigeria's economy until the 1970's when the crude oil was discovered in the country in commercial quantity. It has remained a valuable crop and major foreign exchange earner among other agricultural commodity exports of the country (Ajayi, and Oyejide, 1974; ICCO, 2001).

Specifically, exports of cocoa beans represented close to 44% of total production in 1997 and 50% in 2013. However, both the quantities exported and their values fluctuated throughout the period 1997-2013 (Table 1). Net trade ranges between a minimum of 128,065 exported tons in 1998 to a maximum of 267,700 tons in 2005, with an average 198,634 tons of exported cocoa beans for the period 1997-2013. Hence, Nigeria is currently a net exporter of cocoa beans (FAOSTAT, 2015). The beans are also used for primary processing of other cocoa derivate products, such as butter, paste, powder and cake together with chocolate, which are then also exported. Cocoa Butter is the second most exported cocoa product in Nigeria.

TABLE 1: Cocoa Beans Trade Flows, 1997-2013

Year	Production (tons)	Import Quantity (tons)	Export Quantity (tons)	Export Values (1000 USD)	Export as a Percentage (%) of Production
1997	318000	0	140000	172000	44
1998	370000	0	128065	193000	35
1999	225000	0	196377	295000	87
2000	338000	0	139000	210000	41
2001	340000	0	175272	210350	52
2002	362000	966	180723	252566	50
2003	385000	0	230560	437160	60
2004	412000	0	255000	312350	62
2005	441000	0	267700	427300	61
2006	485000	0	189500	306000	39
2007	360570	0	174900	285100	49
2008	367020	55	227303	491923	62
2009	363510	427	247000	599000	68
2010	399200	499	226634	659886	57
2011	391000	500	219000	635000	56
2012	383000	510	199800	460000	52
2013	367000	1	182900	420000	50

Source: FAOSTAT, 2015

Main trading partners importing cocoa beans from Nigeria are European Union Countries. Among all, The Netherlands holds the biggest share of quantity imported from Nigeria between 2005 and 2010, with an average of 30% of total quantity exported during those years. With 13% and 12% respectively of share Belgium and France follow the Netherlands, while the UK and USA both imported 5% of cocoa beans from Nigeria during the same time frame. Producer prices in Nigeria are determined by market conditions in both the internal and international markets (Traore, 2009). Apart from its contribution to the nation's economy, Cocoa is a plant-based food that contains carbohydrates, fats, proteins, natural minerals and some vitamins and like several other plant foods such as tea, red wine, fruits, vegetables and nuts cocoa contains a group of compounds which exhibit health benefits (Taubert *et al.*, 2007). Research conducted at Harvard Medical School showed that heavy consumers of cocoa had significantly lower rates of heart disease and cancer compared to those who consume less. Cocoa has a unique natural taste and colour and possesses a delicious aroma used in many food products for extra flavour and colour (ICCO, 2005).

In spite of its significance however, Folayan, *et al.*, (2006), noted that cocoa production in Nigeria has witnessed a downward trend after 1971 season, when its export declined from 308,000 tons to 216,000 tons in 1976; 150,000 tons in 1986 and 110,000 tons in 1991 (Koekoek, 2003). And in spite of spirited effort to increase output as engendered by the Structural Adjustment Programme (SAP), output only increased to 205,000 tons in year 2000 (Oluwasola *et al.*, 2015). Cocoa output experienced a continuous increase from 2000 to 2006 (485,000 tons). Afterwards, cocoa output started experiencing fluctuation from 2007 through 2010. In 2011, the output was 391,000 tons which witness steady decrease to 367,000 tons in 2013 (FAOSTAT, 2015). Federal and State government of Nigeria have made it a matter of policy attention to diversify the present over dependence of the country's economy on oil, by focusing on tree crops such as cocoa and food

crops such as cassava productions, which is reflected in the set-up of the presidential initiatives on the production of these crops. The Federal Government's concern at diversifying the nation's export base has placed cocoa in the center-stage as the most important export tree crop (Nkang *et al.*, 2006). Since the early 1980s, dramatic changes in export commodity markets, and other shocks resulted in a drop in the price of cocoa and other raw material in the world market. Financing is important for an enterprising cocoa sector. Apart from purchasing inputs, credit is used by farmers to support their households during the off-season and hire or buy land to expand their farm holdings.

Some of the problems attributed to the decline in cocoa production include labour shortages, low producer prices and lack of credit facility to support production practices (Asare, 2005). Nkang *et al.*, (2006) stated that access to bank loan by cocoa farmers was a big problem due to lack of collateral and the risky nature of agricultural production. As a result of the failure of the commercial and merchant banks to provide sufficient funding for the agricultural sector, the Nigerian Agricultural Bank Limited was established in 1973 by the Federal Government to deal exclusively with agricultural loans. The provision for the establishment of the bank was developed during the 1st national development plan period of 1962-1968 but was not implemented until the 2nd period which spanned between 1970 and 1974 (<http://www.novapdf.com>)

The establishment of this specialized bank was actualized following the acceptance of the recommendations made in Stoneham's report and subsequent inclusion in the 1970-1974 Development Plans. Based on the plan, the proposed agricultural cooperative bank which was meant to operate in all states of the federation will assist farmers in the area of cooperative farming and agricultural marketing cooperatives. The bank was meant to make funds available directly to cooperatives, credit-worthy individuals and Governments. As part of government effort to provide low-cost credit to small holder and commercial farmers, the Nigerian Agricultural and Cooperative Bank (NACB) was conceptualized to specifically enhance the development of the nation's agricultural sector. However, the bank was restructured in 2000 into a new one called 'Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) from the amalgam of the former Peoples Bank of Nigeria, the NACB, and the Family Economic Advancement Programme (FEAP). The new institution was mandated with the responsibility of accepting deposits from customers and offering loans and or advances whose interest rates are stratified according to the purpose for which they are obtained (Fakayode *et.al.*, 2009).

A plan to reposition the Bank into an effective and sustainable national agricultural and rural development finance institution in 2010 led to a further name change to Bank of Agriculture Limited (BOA). The aim of BOA is to ensure effective delivery of agricultural and rural finance services on a sustainable basis to support the national economic development agenda, including food security, poverty reduction, employment generation, reduction in rural to urban migration, less dependency on imported food items, and increase in foreign exchange earnings (<http://www.bankofagricultureng.com>, 2015). However, researches had shown that use and delivery of BOA credit was affected by the constraints such as bureaucracy, delay in loan disbursement, administrative cost, among others. Reducing the bottle necks for the farmers will increase use of BOA credit, thus increasing agricultural production (Ugbajah, and Nenna 2014; Yesufu *et al.*, 2013)

Syngenta foundation for sustainable agriculture (2012) established that Public-Private Partnerships (PPPs) in agriculture as important mechanism to harness technology, resources, skills, expertise and market access to improve the livelihoods of resource-poor smallholders in developing countries. Public-Private Partnerships (PPPs) is a generic term for the relationships formed between the private sector and public bodies. Public-private partnerships have been a collaborative venture between the public and private sectors built on the expertise of each partner that best meets clearly defined goals through the appropriate allocation of resources,

risks and rewards” (Bettignies and Ross, 2004). These arrangements generally entail “reciprocal obligations and mutual accountability, voluntary or contractual relationships, the sharing of investment and reputational risks, and joint responsibility for design and execution” (World Economic Forum, 2005). The public and private sector realize that they need to work together in order to more effectively solve problems which would be more difficult, if not impossible, to be resolved by working alone. (Inter-American Development Bank, 2012).

Technoserve (TNS) is an international non-profit development organization, founded in 1968. Its mission is to help entrepreneurial men and women in poor rural areas of the developing world, to build business that create jobs, income and economic opportunity for the families, communities and countries. Technoserve was registered in Nigeria as non-profit organization in 2010, and has engaged in collaboration with key public and private sectors including cocoa, poultry, and feed grains. Technoserve works with groups and individual farmers to address market failure (constraints that prevent agricultural market system from operating efficiently), develops capacity (improves farmers productivity efficiency and competitiveness), promotes market connection (coordination of market participants and connecting emerging businesses and farm to capital, market, network, suppliers and qualified labour) and improves the business environment (encouraging self-sustaining economic activity, by addressing the policies, information and incentives that help market function better).

In line with Agricultural Transformation Agenda of the Federal government, non-governmental organization such as Technoserve is in collaboration with Bank of Agriculture with the aim of increasing cocoa production and strengthen the economy of cocoa growing communities (<http://www.technoserve.org>, 2015). Technoserve developed a number of programs to address constraints in cocoa production, such as a program connecting cocoa farmers with access to input credit such as fertilizer and pesticides (herbicides, fungicides and insecticides) which have potential to double cocoa yield on smallholder plots. As a results of the fact that most Nigerian farmers do not have access to the credit to purchase these inputs, Nigerian cocoa producers are achieving only 30 percent of their potential yields. Hence, Technoserve acts as a facilitator in positioning cocoa farmers to secure credit from Bank of Agriculture. The inputs credit facilities from Technoserve given to cocoa farmers are fertilizer, pesticide (herbicide, insecticide, fungicide) and seedlings. These inputs are supplied to the cocoa farmers on credit. At the end of the cropping season, the farmers sell their produce to Technoserve receiving agents who register farmers with BOA by making payment for their produce into each cocoa farmers’ account whereby BOA now make payment transfer in respect of input procured on credit to Technoserve, thereby making the farmers to be in position to access credit facilities from BOA. The collaboration is believed to provide solution to the identified problems of input credit among cocoa farmers.

Statement of Research Problem

Literatures have identified lack of adequate credit facilities and rural banking infrastructure as major problems for cocoa farmers as very limited proportion of farmers have access to formal credits (Institute of Development Studies, 2008). In addition, Onumah *et al.* (2014) and Pischke and Adam (1980) reported that inadequate credit facility was found to hinder productivity of cocoa farmers and have negative consequences for cocoa marketing. Fesenberg (2012) also found out that low income and productivity of cocoa farmers is as a result of poor access to quality input credit and technology and poor access to buyers and market information. Majority of cocoa farmers are not organized in cooperative, and infrastructure and hence input finance are inadequate (Fesenberg, 2012). Cocoa production has been on decline over the years and this is partly attributed to poor infrastructure together with credit and marketing (Denning *et al.*, 2009).

To resuscitate cocoa production and marketing; and hence, salvage the cocoa industry from further declining, some individuals and private organizations have been involved to complement the efforts of the governments. Government intervention programmes such as Structural Adjustment Programme (SAP), Agricultural Credit Guaranty Scheme (ACGS), Bank of Agriculture (BOA) and Nigerian Incentive Based Risk Sharing Agricultural Lending (NIRSAL) were aimed at increasing cocoa production and thereby strengthen the economies of cocoa farming communities in respect of input credit accessibility in line with the Federal Government Agricultural Transformation Agenda. In spite of the existence of these programmes, Nigerian cocoa farmers are achieving only 30% of their potential yields (<http://www.technoserve.org>, 2015). Bank of Agriculture (BOA) engages in collaborative scheme with Technoserve (TNS) in order to foster pooling together of resources and skills to help small holder cocoa producers access input credit from BOA's loans schemes. The collaboration between BOA and TNS which helps to educate, supervise and provide cocoa farmers and marketers with assistance in accessing credit and marketing of cocoa in poor rural areas of Ekiti State is yet to be assessed.

Therefore, this study examined the contribution of Technoserve– BOA service to the production of cocoa in Ekiti State. It assessed the willingness of farmers to use Technoserve–BOA services which has not been empirically researched. The major question therefore is; has the accessibility of input credit through Technoserve–BOA service by the farmers helped the production of cocoa? The broad objective is to comparatively analyze users and non-users of Technoserve facilities in the production and marketing of cocoa in Ekiti state.

Methodology

Ekiti State, located within latitude $7^{\circ}15^1$ and $8^{\circ} 15^1$ North of the equator and longitude of $4^{\circ} 45^1$ and $5^{\circ} 45^1$ East of the Greenwich meridian, was created out of the old Ondo State in 1996 with its capital in Ado Ekiti in the south west geopolitical zone of Nigeria (Akinyemi *et al.*, 2013). The State enjoys tropical climate which has the wet and dry seasons. Mean annual temperature ranges between 21°C to 28°C and mean annual rainfall ranges between 1200mm to 1800mm (Ugwuja *et al.*, 2011) while the mean relative humidity is over 75% (Ekiti State Government, 2008). The population of Ekiti State as reported by National Population Commission 'NPC' (2006) is 2,384,212 people with more than 80% of the population engaged in farming as main source of livelihood (Olaitan and Oladipo, 2002). The State has 16 administrative Local Government Areas (LGAs) divided into three (3) agricultural zones. It is suitable for livestock rearing, production of cash crops such as cocoa, coffee, kola nut and food crops such as yam, cassava, cocoyam, plantain and so on (Kuponiyi and Bamigboye, 2009). Since the climate in the study area support the minimum requirement for cocoa production, the people in the study area have taken advantage of it to produce and market cocoa products, making them require proper financing for optimal production.

Sampling Procedures

A multi-stage sampling technique was employed in selecting the respondents. The first stage involved stratified sampling techniques of the LGAs into those who use and those who do not use the facilities provided by Technoserve. The second stage involved purposive selection of Gbonyin LGA which was the only LGA in which Technoserve activities were operated. The third stage involved stratification of the LGAs without the activities of TNS based on intensity of cocoa production. The fourth stage involved the random selection of one LGA from the high producing LGAs. The fifth stage involved random selection of 120 respondents from each of the two LGAs making a total of 240 respondents.

Data Collection

Primary data was collected using a pretested questionnaire. Data collected include socio-economic characteristics of the respondents such as age, sex, marital status, family size and level of education; types and value of assets owned by the respondents such as farmland, cutlass, hoe, knapsack sprayer; the income of cocoa farmers and total expenditure on cocoa inputs used such seedlings, agro chemicals, fertilizer, etc. Data were also collected on revenue from marketing and production of cocoa. A total of 240 respondents were interviewed with the help of well-structured questionnaires to obtain information from the respondents.

Analytical Techniques

Descriptive statistics

These were used to describe the socio-economic characteristics of the respondents. This involved the calculation of percentages, frequency counts and mean values for parameters such as farmers' age, gender distribution, level of education, farm size, inputs and output level.

Budgeting techniques

These were used to compute the costs and returns of users and non-users of Technoserve service in the study area. The profitability of the two groups were determined and compared. Budgetary analysis (Gross Margin Analysis) was used by Henri-Ukoha *et al.* (2011) to analyze the Net Farm Income, Gross Margin and Benefit Cost Ratio. Budgeting technique used to assess the profitability of cocoa production is as given below:

$$TR = \text{Price} \times \text{Quantity}$$

$$TC = TFC + TVC$$

$$GM = TR - TVC$$

$$NI = GM - TFC$$

Where:

GM = Gross margin

TR = Total revenue

TVC = Total variable cost

NI = Net Income

TC = Total cost

TFC = Total fixed cost

The performance and economic worth of the respondents were determined by the use of the following Profitability ratios:

1. Benefit Cost Ratio (BCR) = TR/TC
2. Expense Structure Ratio (ESR) = FC/VC
3. Rate of Return (ROR) = NR/TC
4. Gross ratio (GR) = TC/TR
5. Net Income (NI) = $GM-TFC$

Multiple regression analysis

Multiple regression analysis was used to establish relationships between economic variables and also used to analyze the input credit effect on net income of users of Technoserve. Regression analysis is an important econometric tool for predicting the values of the dependent variable. It measures the degree of association between two or more variables. The coefficient of determination which is denoted by R^2 , shows the percentage of the total variation in the dependent variable explained by the independent variables in the model. Regression

coefficient tells us the amount of change that will be observed in the value of the dependent variable when the values of the independent variables alter. The model is specified as:

$$Y_1 = f(X_1, X_2, X_3, X_4, U) \dots\dots\dots (1)$$

Where, Y_1 = Net Income (₦)

X_1 = Fungicide (kg)

X_2 = Seedlings (₦)

X_3 = Insecticide (litres)

X_4 = Herbicide (litres)

U = Error term

Measurement of variables

The data used in determining the net income of cocoa production among cocoa farmers in the study area were: labour, fungicides, seedlings, age of cocoa farmers, education, insecticide, farming experience and herbicide.

Net income: The net income of various farmers was measured by subtracting total cost of cocoa production from total revenue which was measured in Naira. The range was between ₦13,700.00 and ₦428,730.00

Fungicide: This was the total number of fungicides in kilogrammes used in the last cropping season. The range was between ₦330.00 and ₦800.00 per kilogramme

Seedlings: This was the number of seedlings planted by individual cocoa farmers.

Insecticide: The insecticide variable was measured by the quantity applied by the farmers in litres. The range was between 1liter and 80 liters

Herbicide: The herbicides variable was measured by the quantity applied by the farmers in litres. The range was between 1liter and 100 liters.

Results and Discussions

Socioeconomics Characteristics of the Respondents

The gender distribution of respondents, almost 95% of the respondents who used Technoserve facility were male, also most (85.0%) of the non-users of Technoserve facility were male. This implies that cocoa production in the study area is largely dominated by men. Women according to Doss (2002) are mostly into production of crops which are more for home consumption. For any agricultural enterprise, age of respondents is very crucial in that age of the farmer has an important bearing on his effectiveness (Adeyemo, 2011). Table 2 presents the distribution of respondents according to their ages. This result shows that the age distribution of respondents ranged between 20 and 92 years. The respondents that were between 31 and 50 years were in the majority (75.8%) among the users of Technoserve facility, while the non-users for the same age range was 57.5%. The mean ages of users and non-users were 44.27 and 48.31, respectively while their standard deviation was 9.75 and 12.70 for both users and non- users, respectively

This suggests that the respondents for both users and non-users of Technoserve facility were in their active and productive age and ready to take advantage of available opportunities. This is in contrary to the findings of Onumah *et al*. (2014) that the age of majority of cocoa farmers were above 60 years of age and also Vigneri (2007) also observed that the mean age of cocoa farmers in Ghana was 49, with a reason being that the young cocoa farmers migrate to cities in search of other jobs. The distribution of the respondents according to their marital status is shown in Table 2. About 95% of the cocoa farmers were married. Only 4.2% were single for both users and non- users of Technoserve facility. This indicates that married people dominated the enterprise which implies that family labour may be provided by family members and may provide contributions to management of farm operations. This is in line with Oluwasola *et al*. (2015), Adebisi and Okunlola (2013)

that married farmers have family responsibilities as well as access to family labour. This should ensure continuity and stability in the enterprise. Education enables the farmers to be more rational when it comes to decision making (Agunbiade, 2015).

Among users of Technoserve facility about 2.5% did not go to school and 62.5% attended secondary school, while among non-users 21.7% did not go to school and 48.3% attended secondary school. This indicated that there is high level of illiteracy among non- users of Technoserve facility which may not allow them to adopt and use Technoserve facilities, while the level of education among the users may make them to be more rational in decision to use Technoserve facilities. The household size is an indication of the potential family labour available for farm operations. The distribution of respondents based on the household size reveals that the majority of the respondents among both users and non-users of Technoserve services had between 6 and 10 members of household, 62.5% for users and 59.2% for non- users. This suggests that family Labour could readily be available in the households under this study. This result agrees with the findings of Osinubi (2003) in a study of urban poverty in Nigeria that members of household were mostly between 6 and 10. The distribution of the respondents according to primary occupation varied, it showed that about 63% of the

Techno serve users and (77.5%) of non-users were primarily engaged in cocoa farming, while only 12.5% and 7.5% respectively were artisans. This implies that farming is the major occupation of those in the study area. The distribution of respondents according to years of involvement in cocoa farming operations ranges between 3 and 50 years. Majority (55.9%) of the users had between 11 and 30 years of experience also 60% of non-users had the same years of experience. This suggests that years of involvement in cocoa farming operations is an indication that they have been in production for many years and are well experienced.

Table 2: Socioeconomic characteristics of the Respondents

	User		Non user	
	Frequency	Percent	Frequency	Percent
Gender				
Male	113	94.2	102	85
Female	7	5.8	18	15
Total	120	100	120	100
Age				
≤ 30.00	7	5.8	7	5.8
31.00 - 40.00	48	40	35	29.2
41.00 - 50.00	43	35.8	34	28.3
51.00 - 60.00	15	12.5	29	24.2
61.00 - 70.00	5	4.2	8	6.7
71.00 - 80.00	2	1.7	6	5
81.00- 90.00	0	0	1	0.8
Total	120	100	120	100
Marital Status				
Single	5	4.2	5	4.2
Married	114	95	114	95
Widowed	1	0.8	1	0.8

Total	120	100	120	100
Level of Education				
Did not go to school	3	2.5	25	20.8
Adult school	2	1.7	4	3.3
Primary school	18	15	21	17.5
Secondary school	75	62.5	59	49.2
Tertiary	22	18.3	11	9.2
Total	120	100	120	100
House Size				
≤ 5.00	33	27.5	36	30
6.00 - 10.00	75	62.5	71	59.2
11.00 - 15.00	11	9.2	10	8.3
16.00 - 20.00	1	0.8	2	1.7
≥ 21			1	0.8
Total	120	100	120	100
Primary Occupation				
Artisan	15	12.5	9	7.5
Civil servant	3	2.5	3	2.5
Driving	2	1.7	2	1.7
Farming	76	63.3	93	77.5
Timber contractor	5	4.2	1	0.8
Trading	19	15.8	12	10
Total	120	100	120	100
Experience				
≤ 10.00	41	34.2	26	21.7
11.00 - 20.00	41	34.2	45	37.5
21.00 - 30.00	26	21.7	27	22.5
31.00 - 40.00	7	5.8	11	9.2
41.00 - 50.00	5	4.2	9	7.5
≥ 50			2	1.7
Total	120	100	120	100

Source: Field Survey, 2015

Availability and Acquisition of Land for cocoa production

30.8% of the total cultivated land available that was less than or equal to 5.00Ha for users of Technoserve facility. Among the non-users, 26.7% had total cultivated land available that was less than or equal to 5.00Ha. The mean total cultivated land available was 10.66Ha and 10.20Ha for users and non-users respectively. This suggests that the land holding capacity by respondents is small which could be as a result of land fragmentation caused by land tenure system and in the study area. 55.0% of the respondents had 5.00Ha or less while 35.8% had between 6.00Ha and 10.00Ha of farm land allocated for cocoa production among users of Technoserve facility. Also among non-users majority (46.7%) had 5.00Ha or less of farm land set aside for cocoa production,

42.5% had between 6.00Ha and 10Ha. This suggests that farmers in this area are really facing the problem of land shortage because of land tenure system which is mostly through inheritance, characterized by fragmentation.

This is in accordance with Economic Commission for Africa (2004) that fragmentation of land holdings had developed among small holder farmers because of inheritance rules. Different methods of land acquisition exist for agricultural land. There is a salient connection between land acquisition and cash crop mode of land acquisition has implication of security of tenure. Table 3 presents the method of land acquisition and this reveals that 53% of the users of Technoserve facility farmers acquired their farm land by inheritance, 28.3% acquired land through purchase while 13.3% were through lease. Among non-users, 37.5%, 36.7%, 20.8% were through inheritance, purchase and lease, respectively. This connotes that majority of the farmers acquired their land by inheritance which also help to decrease the total cost of production.

Table 3: Availability and Acquisition of Land for cocoa production

	User		Non user	
	Frequency	Percent	Frequency	Percent
Total Farmland (Ha)				
≤ 5.00	37	30.8	32	26.7
6.00 - 10.00	34	28.3	49	40.8
11.00 - 15.00	27	22.5	23	19.2
16.00 - 20.00	11	9.2	6	5
21.00 - 25.00	4	3.3	7	5.8
26.00 - 30.00	7	5.8	2	1.7
≥ 30	0	0.0	1	0.8
Total	120	100	120	100
Land Allocated to Cocoa				
≤ 5.00	66	55	56	46.7
6.00 - 10.00	43	35.8	51	42.5
11.00 - 15.00	10	8.3	10	8.3
≥ 21.00	1	0.8	3	2.5
Total	120	100	120	100
Method of land acquisition				
Inheritance	64	53.3	45	37.5
Purchase	34	28.3	44	36.7
Lease	16	13.3	25	20.8
family land	1	0.8	1	0.8
inheritance and purchase	3	2.5	3	2.5
purchase and lease	2	1.7	1	0.8
Inheritance and lease			1	0.8
Total	120	100	120	100

Source: Field survey, 2018

Budgeting Techniques of Comparative Analysis of Users and Non-Users of Technoserve Facilities in Cocoa Production

The result of costs, returns and profitability of cocoa farm enterprise by users and non- users of Technoserve services is presented in Table 4. It was found that for users of Technoserve facility, variable inputs constitute about 77.71% of the total cost of production. Also, it was found that for non-users about 74.30% of the total cost of production was on variable inputs. Cost of Labour accounted for 41.90% for users of Technoserve services, while cost of Labour for non-users accounted for 40.82%. This suggests that a relative amount of money spent on hired Labour, was almost the same for both users of Technoserve services and non-users. The cost of fungicide made up 13.14% for users, and 8.26% for non-users. Cost of herbicide account for 4.61% of the total cost of production for users and 2.14% for non- users.

The mean value of total variable cost and total fixed cost were ₦140,348.63 and ₦40,252.85, respectively for users and for non-users. Mean value of the total revenue was ₦276,562.77 while the Net Farm Income (₦95,961.29) which was measured by subtracting total cost from total revenue for users and the mean total revenue for non-users was ₦ 171,619.47 and net farm income of (₦42,407.28). This indicates that the enterprise is more profitable with the use of Technoserve facility. Subtracting total variable cost from total revenue, the gross margin equals ₦136,214.14 for users and ₦75,641.14 for non- users.

A profitability measure which is also an attempt to estimate the future outcome of a plan in both qualitative and financial terms. Profitability ratios included in this study are profit margin which gives a value of 34.70% for users indicating that for every ₦1.00 generated from the enterprise a net income of ₦0.34 is earned, while for non-users the profit margin value of 24.71% will generate net income of ₦0.24 for every ₦1.00 spent; the value of per capital outlay gives 0.53 for users which implies that from every ₦1.00 invested into the enterprise, a net income of ₦0.53 was realizable and for non-users ₦0.33 was realizable. Operating Cash Expenses Ratio whose value is 0.51 and 0.56 for users and non-users respectively shows that from every ₦1.00 generated from the enterprise, ₦0.51 and ₦0.56 was invested, respectively as running cost into the enterprise. This suggests that users had low running cost. Also, Benefit-Cost Ratio of 1.53 for users and 1.33 for non-users implying that for every ₦1.00 investment on cocoa production ₦1.53 and ₦1.33, respectively was realizable. This suggests that users realize more on their investment. All these ratios affirm that cocoa marketing was profitable with the use of Technoserve Services.

TABLE 4: Results of the Comparison of the Budgetary Analysis of Users and Non-Users of Techno serve Facilities in Cocoa Production in Ekiti State, Nigeria

S/N	Items	Users		Non-Users		T-Test
		Mean amount (₦)	%TC	Mean amount (₦)	%TC	
1	REVENUE					
I	Quantity of Cocoa (kg)	606.83		378.50		
II	Price per kg (₦)	455.75		453.42		
A	Total Revenue (TR)	276,562.77		171619.47		9.51
2	VARIABLE COST					
I	Cost of Herbicide	8,332.25	4.61	2768.33	2.14	
II	cost of fungicide	23,739.04	13.14	10678.75	8.26	
III	Cost of insecticide	8,430.67	4.67	4039.58	3.13	
IV	Cost of fertilizer	257.50	0.14	225.00	0.17	
V	Cost of transportation	2,3916.67	13.24	25516.67	19.75	
VI	Cost of Labour	75,672.50	41.90	52750.00	40.82	
B	Total Variable Cost (TVC)	140,348.63	77.71	95978.33	74.30	7.66

C	Gross margin (TR-TVC)	136,214.14		75641.14		9.67
D	FIXED COSTS					
I	Cost of Cutlass	7,654.17	4.24	4349.50	3.37	
II	Cost of Hoe	2,656.60	1.47	2641.39	2.04	
III	Cost of Knapsack Sprayer	3,334.31	1.85	2620.86	2.03	
IV	Cost of Wheel Barrow	1,264.38	0.70	1215.97	0.94	
V	Cost of harvesting hook	2,856.25	1.58	1468.75	1.14	
VI	Cost of file	2,587.50	1.43	1411.25	1.09	
VII	Cost of jute bag	557.08	0.31	407.68	0.32	
VIII	Cost of Basket	1,120.00	0.62	1007.92	0.78	
IX	Cost of Basin	1,221.46	0.68	1112.88	0.86	
X	Cost of head pan	456.94	0.25	1282.58	0.99	
XI	Land rent	12,166.67	6.74	13100.00	10.14	
XII	Cost of seedlings	4,377.50	2.42	2615.08	2.02	
D	Total fixed cost	40,252.85	22.29	33233.86	25.70	2.89
E	Total Cost (TC) = (TFC + TVC)	180,601.48	100.00	129212.19	100.00	6.99
F	Net Income (NI) = (GM - TFC)	95,961.29		42407.28		11.00
G	Profit Margin = F/A *100	34.70		24.71		
H	Return per Capital Outlay = F/E	0.53		0.33		
I	Operating Cash Expenses Ratio = B/A	0.51		0.56		
J	Benefit Cost Ratio = A/E	1.53		1.33		
K	Net Farm Income Ratio = F/C	0.73		0.58		

Source: Data Analysis, 2015

Costs and Profit per Unit of cocoa production of users and non-users of TECNOSERVE Facilities

Table 5 present both the cost and profit per unit of both users and non-users of TNS in the study area, the total variable cost of users (231.28) was found to be lower than that of the non-users (253.58) while profit per unit of users (158.14) was found to be higher than that of non-users (112.87), this implies that users of TNS incur less cost in their production process all because of the provision of reasonable credit and input by TNS at an appropriate time, this was not the case for non-users.

TABLE 5: Cost and Profit per Unit of cocoa production of users and non-users of TECNOSERVE Facilities

	Users	Non-users
TVC per Unit(₦)	231.28	253.58
Profit per Unit	158.14	112.87

Source: Data Analysis, 2015

Effects of Input Credit supplied by Technoserve on Net Income among Cocoa Technoserve users

Table 6 presents the results of multiple regression model. The lead equation was double-log. This was because of the high adjusted R-square, minimum standard errors and high number of independent variables that were significant. All the independent variables had positive relationship with net farm income of the respondents except quantity of insecticide used by the respondents while quantity of fungicide, number of seedlings, and quantity of herbicide used were in conformity with a priori expectation, quantity of insecticide was not.

The multiple regression table shows that the model fits the data reasonably. The adjusted R-square was 0.358. This suggests that 35.8% of the variability in the net farm income of the respondents is explained by variations in the specified explanatory variables considered. The results further shows that all the coefficients of the specified explanatory variables were significant at acceptable levels. Quantity of fungicide used by the cocoa farmers was positively related and statistically significant at 1%. This can be interpreted as additional increase

in the quantity of fungicide used in cocoa production will bring about 65.9% of the net farm income of the respondents. This is in accordance with the finding of Iya and Kwaghe (2007) that increase in the use of pesticide will increase output of cowpea which will invariably increase net farm income. Interestingly, quantity of herbicide used by the cocoa farmers was positively related and statistically significant at 10%. This indicates that as the quantity of herbicide used is increased by a liter, there is increase in the net farm income of the respondents by 12.8%. This result is in line with Grema and Gashua (2014) who confirmed that increase in quantity of herbicide could increase the output and net farm income of onion.

More also, amount of seedling planted by the farmers was positively related and statistically significant at 5%. This suggests that as the farmers are provided with more seedlings, there will be increment of 71% in the net income of the farmers. This result is in conformity with the finding of Onoja *et al*. (2012) that increase in seedlings can increase net farm income of the cocoa farmers. On the contrary, quantity of insecticide used was negatively related and statistically significant at 10%. This means that increase in the use of insecticide by one liter, this will result in 15.8% decrease in net farm income of the respondents. This finding is in agreement with Adesiyani (2015) that further increase in the use of insecticide might have a negative effect on output and net farm income of maize.

Table 6: Effects of Input Credit on Net Income among Cocoa Technoserve users

Variables	Linear		Exponential		Semi-log		Double-log	
	Coefficients	Std. Error	Coefficients	Std. Error	Coefficients	Std. Error	Coefficients	Std. Error
Constant	34023.71***	10962.366	10.709***	.099	-20229.257	36065.360	10.080***	.293
Herbicide	1725.60***	553.187	0.012**	.005	14830.236*	8568.457	.128*	.070
Insecticide	-570.92**	265.915	-0.004	.002	-22005.635***	7619.996	-.158**	.062
Fungicide	11799.76***	2697.881	0.127***	.024	70477.706***	17001.399	.659***	.138
Seedlings	0.91	0.822	1.101E-5	.000	6526.199	4288.410	.071**	.035
R-square	0.298		0.331	.099	0.312		0.388	
Adjusted R-square	0.273		0.308	.005	0.279		0.358	
F-value	12.18		14.22		9.30		13.00	
P-value	0.000		0.000		0.000		0.000	

Source: Data Analysis, 2015

***, ** and * represent 1%, 5% and 10% significant level respectively

Conclusion

In conclusion the study showed that majority of the respondents' farmers in both users and non-users were over forty years of age with secondary educational level. Land holding capacity of the farmers is small and the mode of acquisition is mainly by inheritance. Positive value of net income and gross margin showed that the enterprise is comparatively more productive for the users of Techno serve facilities. Farmers in the study area could improve their market margin through the use of Technical Support Services (TECHNOSERVE).

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