ASSESSMENT OF COMMERCIAL AGRICULTURE DEVELOPMENT PROJECT (CADP) FOR MAIZE VALUE CHAIN IN NIGERIA

BY

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CERTIFICATION

This is to certify that this work "Assessment of Commercial Agriculture Development Project (CADP) for Maize Value Chain in Nigeria" was carried out by OSHAJI, IFEDAYO OLUWAKEMI (Reg. No: 20154986238) in partial fulfillment of the requirements for the award of Doctor of Philosophy (PhD) in Agricultural Economics.

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DEDICATION

This work is dedicated to God Almighty

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ABSTRACT

This study assessed the Commercial Agriculture Development Project (CADP) for Maize Value Chain in Nigeria. The specific objectives of the study were to: assess the level of gender involvement and segmentation supported by the project in the targeted value chain; assess the performance of CADP relative to baseline in terms of Commodity Interest Groups' (CIGs) technology adequacy and demographic variables, assess the performance of maize value chain relative to baseline production, processing and sales, estimate the socioeconomic factors of the commodity interest groups that influence the production, processing and sales performance of the targeted value chain; estimate the institutional and socioeconomic factors that affect the availability of CADP's matching grant to commodity interest group in maize value chain; and examine the factors constraining the implementation of CADP along maize value chain. A multi-stage sampling technique was used in the selection of sample for this study. Data were collected from 360 maize farmers. Data collected were analyzed using descriptive statistics, functional analytical tool, Duncan Dissimilarity Index (DDI), performance index, multivariate regression technique, multivariate probit model and principal component analysis. The result revealed that the male producers had the highest percentage (17%) of capital inadequacy which invariably affected the rate of returns. The pooled data of the maize processors showed that 59.6% of the respondents were male while 40.4% were female indicating that the males were more involved in maize processing than their female counterpart in the study area, which is not so in other studies. This could be attributed to the customs and tradition as well as the insecurity in the study area. The pooled result of the level of dissimilarity index showed that the female actors in the study area dominated in the area of capital disbursed and output. This means that 1.21% of capital disbursed and 1.872% of output favored the females than their male counterparts. This result means that the female actors are more capital adequate and this could be because the females are making more effort in adding capital from external sources which positively affects their output. The result further revealed that value added to maize products can significantly enhance sales performance by 2.98 X 10^{-08}. The average total variable costs incurred on maize production in the study was ₦283,651.06 while the total revenue realized was ₦619,447.61 which indicates that maize production is a profitable farm enterprise. The result also showed that the net farm income of the farmers is significant and positive (0.0001), hence increase in their farm income will make them comply with the sharing formula and provide their matching grant as soon as there is need for it in maize value chain activities. There was improvement in the technology adequacy in the study area: the pooled data showed that the technology adequacy in the base year was 47.7% and 58.3% in the current year. The pooled result further showed that performance in processing and marketing/sales outran the baseline by 104.88% and 120.82% respectively. The Principal Component Analysis (PCA) extracted 6 major factors constraining the implementation of CADP in the value chain namely: delay in fund disbursement, insufficient access to fair market price information, inability to provide percentage requirement for the fund, funding do not obey the sharing, land tenure problem and poor infrastructure (roads, irrigation, poor harvest facilities). The Federal and State government should improve the infrastructural facilities especially the road networks to serve as an incentive to rural farmers to work harder to increase productivity, subsequently increasing income and reducing the length of time products take to get to the final consumers thereby reducing spoilage as well as wastage.

Keywords: Commercialization, Commercial Agriculture Development Project, Maize, Value Chain, Community Interest Group

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Agriculture is the backbone of most developing economies and structural transformation an important vehicle for economic development in low-income agrarian contexts (Newman et al, 2020). According to Nolte et al (2016), investors have been increasingly acquiring land in developing countries for huge farming operations. Agricultural development has a key role to play in relation to poverty reduction, in the context of economic development and growth as a whole (FAO, 2015). A critical component of economic growth and development for agro-based economies is commercialization of agriculture (World Bank, 2008). Farmers are very slow in shifting to commercialization owing to some constraints like the poor credit facilities and land tenure problems as well as climate change challenges. The farming and land tenure systems in Nigeria are negatively impacting on commercial agriculture and food security (Wiggins *et al.,* 2011). On the other hand, limited financing and decline in new investments hinder agricultural development (Earle, 2011). Credit to the agricultural sector is considerably vital in stimulating agricultural output (Enoma, 2010). However, access to these finance sources has been difficult in terms of availability, timing, amount and the lack of security for more formal (private/bank) credit. Hence, agricultural finance remains a persistent constraint to commercial agriculture (Ofana et al, 2016).

There are several agricultural funding windows (development finance institutions) such as the Central Bank of Nigeria (CBN), Agricultural Credit Guarantee Scheme Fund (ACGSF), Nigerian

Agricultural Cooperative and Rural Development Bank (NACRDB), International Development Agency (IDA), Nigeria Incentive-Based Risk Sharing Systems for Agricultural Lending (NIRSAL) and pro-poor target projects such as Commercial Agriculture Development Project (CADP) that sustain small and medium scale farmers in Nigeria. Commercial Agriculture Development Project was a comprehensive five-year project (2009-2013), and revised till May 2017. The project was developed by the Federal Ministry of Agriculture and Water Resources (FMAWR) in collaboration with the World Bank and other stakeholders: International Development Agency (IDA), State Governments and the farmer-beneficiaries otherwise called the Commodity Interest Group (CIG), to help participating small and medium scale commercial farmers to access improved technology, infrastructure, finance and output markets (Lagos State Ministry of Agriculture & Cooperatives, Commercial Agriculture Development Project & World Bank, 2013). The Project was implemented in five States of the Federation along eight value chains. The states are Cross Rivers (oil palm, cocoa and rice), Enugu (fruit trees, poultry and maize), Kaduna (Fruit trees, Dairy and maize), Kano (Rice, Dairy and maize) and Lagos (poultry, aquaculture and rice). The objective of the Commercial Agriculture Development Project for Nigeria is to strengthen agricultural production systems in Nigeria by supporting the commercialization of agricultural production, processing and marketing outputs among small and medium-scale commercial farmers and agro-processors (CADP, 2012).

Maize output commercialization and increased productivity is considered as one of the major solutions to effectively addressing the current global food crisis and poverty. This is because maize is one of the major staples in Nigeria. A food consumption survey carried out by International Institute of Tropical Agriculture (2014), showed that maize was the most often consumed staple, with 20% of the population eating it at least once a week. Nigeria is the 10th

largest producer of maize in the world, and the largest maize producer in Africa, followed by South Africa (USAID, 2010). Maize accounts for the majority share of Nigeria's coarse grain production with 11.6million tons (MMT) produced between 2021 and 2022 (United States Department of Agriculture, 2022).

Maize is grown in the entirety of the country (both yellow and white varieties), with the North Central region as the main producing area. In the fourth quarter of 2017, the National Bureau of Statistics (NBS) released a report indicating that Nigeria was importing maize from foreign countries at an annual value of approximately ₦146.8billion (NBS, 2017). Seventy percent of farmers are smallholders, with an average of 2ha area of cultivated land accounting for 90 percent of total farm input. Maize is utilized in a variety of ways, depending on the user's need. In Nigeria the crop can be used as feed ingredient in livestock management. Maize can be consumed as food by boiling or roasting as paste (Adiaha, 2017).

The demand for maize in the country is projected to grow by 3.2% annually, driven by the potential expansion of urbanization and population. Nevertheless, a significant disparity exists between the demand for maize and its supply in Nigeria (Fadiji & Aboaba, 2020). The growing gap between the demand for maize and supply has necessitated the need to understudy the assessment of developmental programmes such as commercialization of agriculture on maize output due to the failure to realize increased productivity in the Nigerian maize sector.

Commercial Agriculture Development Project strives to sustainably boost the incomes of target beneficiaries, through a value chain approach with strong emphasis on stakeholder participation, especially at the Commodity Interest Groups (CIGs) and Commercial Agriculture Development Associations (CADAs) levels. In agricultural value chains, women make up a large part of the

work force. Women rights and benefits derived from their participation in the value chain are frequently violated, and their contributions to the economy are largely invisible (KIT, Agri-Pro Focus & IIRR, 2012). Lastarria (2006) asserted that while women involvement in agricultural production has increased; their participation in value chain development activities is concentrated in lower levels of the value chain especially in production. The programme provides more support to women at end target of value chain. The programme is showing more support for female than male beneficiaries. World Bank (2016) reported that additional 9.15% of male beneficiaries and 37.64% of female beneficiaries are needed to meet the end target and expected number of beneficiaries at the end of the project by 31st of May 2017.Direct beneficiaries are aggregated into formal groups known as commodity interest groups (CIGs).

There are two components to the project. The first component of the project is agricultural production and commercialization. This component provides resources to facilitate the adoption of appropriate and existing agricultural technologies. It also supports staple crop production systems to complement the country's food security initiatives and develop both the domestic and export markets. There are four sub-components, namely, technology demonstration and adoption; support to staple crop production systems; market facilitation; and capacity building. The second component of the project is rural infrastructure. This component provides resources for construction of new roads, rehabilitation of existing ones and maintenance of roads to communities, and selected agricultural activities (World Bank, 2009). A road serves as a linkage between the farm and the input market. Therefore, farms with access to roads can also easily access input markets, thus have a higher input commercialization. Access to road also enables input marketers to easily get to the farm (Kabiti et al., 2016). The effort of CIGs in achieving

their targeted goals in Nigeria has been questioned in both areas of production and commercialization. This is blamed on grant assessment (World Bank, 2016).

Empirical evidence suggested that though the yield performance of some enterprise like maize value chain increased by 38.9% in Enugu, Kano and Kaduna, registration and formation of CIGs tend to increase marginally (World Bank, 2016). The sales also met the expected target of 55.3% but the expansion of CIGs did not meet the expected target (World Bank, 2016). Osmani and Hossain (2015) opined that commercialization of agricultural enterprise can occur in increasing production and market surplus or even both. This effort entails market-oriented pattern of production of input use. According to Abu (2015), a commercialized enterprise like Commercial Agricultural Development Programme must reflect an output market from timely low cost of production. This is the only condition that can encourage CIGs formation/registration for a large scale production plan.

Though a low registration/formation of CIGs was recorded in 2010, World Bank (2016) observed a marginal increase in 2011 and 2012. The project registration encourages a matching grant to improve productivity and commercialization of the targeted value chain in the five participating states (Kolade, 2015). It is important to note that strong emphasis is on stakeholder participation especially at CIG and CADA levels. The beneficiaries are not only small and medium scale farmers, but also input suppliers, processors, traders and market associations. Others are secondary beneficiaries who may have access to road, energy supplies and market linkages as these can enable input market function efficiently (Kabiti et al., 2015). Though the marketing grant for maize enterprise for instance increased marginally, from N136,310,000.70 in 2010 to N210,038,763.90 in 2012, a poor access index of 43.1%,43.9% and less than 38.6% in

2010, 2011 and 2012 respectively was recorded (World Bank, 2016). This showed that the gap between grant approval and access can force down stakeholder participation and benefits expected in future projects (Ani, 2013).

The intervention and Resettlement Action Plan (RAP) at Kauran Mata farm access road in Madobi Local Government Area of Kano State provided policy and procedures for land acquisition, compensation and resettlement of Project Affected Persons (PAPs) and replacement of their losses due to the construction of the farm access road (World Bank and Kano State Commercial Agricultural Development Project, 2016). These government projects and interventions are essential for agricultural development in Nigeria, as Mmari (2015) asserted such government projects are considered not only as key determinant for driving economic transformation but also as a critical element for fostering innovation and competitiveness.

1.2 Statement of the Problem

According to National Agricultural Extension and Research Liaison Services (2019), 90% of Nigeria's total food production comes from small farms and at least 60% of the country's population earns their living from these small farms with farm sizes generally less than 2hectares. The country is generally endowed with abundant agricultural resources and yet the population is facing the problems of low productivity and food insecurity. This results from poor access to modern input and subsistence nature of the farming system. There are various agricultural projects initiated by the Nigerian government for the development of agriculture, but these projects focused only on continuing increases in production and/or productivity of food crops to meet increasing demand for food. They however neglected the value chain development and commercialization of these food crops. Value chain that is market-driven ensures proper

integration of the key actors and resource distribution along the chain and mitigating waste of perishable products. Nigeria's agricultural sector suffers from a series of inter-related constraints. Key among these includes lack of infrastructure, appropriate technology, weak advisory services, post-harvest losses, poor access to markets and lack of finance. Commercial Agriculture Development Project (CADP) was aimed at improving agricultural production in Nigeria by supporting commercialization of agricultural production, processing and marketing outputs among small and medium-scale commercial farmers and agro-processors (CADP, 2015).

The Commercial Agriculture Development Project is a response to the food crisis in Nigeria. The Project is supporting staple food production systems in the participating states. Support for staple crops is focused on maize and rice. An estimated US$58.6m will support mainly small-scale commercial farmers to increase their staple crop production through both intensification and expansion of their rice and maize holdings to complement the country's food security. It is important to understudy this programme, which is the thrust of this research so that the performance of this programme could be assessed (CADP, 2015).

Furthermore, Lawal (2013) observed that the low yield in maize was a problem militating against increased and sustainable farm income and food security among maize farmers in North-Western Nigeria. Due to poor performance of the agricultural sector, the Federal Government of Nigeria has identified investment in agriculture as a major priority so as to reform the sector to its enviable position in the Nigerian economy. However, it was observed that government efforts over the years have not yielded the desired results (Abiola and Olaopa, 2008; FAO, 2011).

A market-driven value chain for maize is important for Nigeria's overall economic development plans, but this cannot be achieved without a sustained and increased market demand for this

targeted commodity. The achievement of this process in maize value chain is very inadequate in Nigeria; hence the commercialization of the products continues to be a mirage. Unfortunately, the prevailing problems in maize production and processing in the country limit the opportunities to strengthen maize markets to better serve the needs of the sector.

On the other hand, given the current recuperating level of commercial agriculture among small and medium scale farmers, the domestic market is not able to absorb the significant increase in production and processing in the short-term. While several appraisal documents projected a strong growth in maize demand, fueled by population growth and income gains, these potential however, lacked the required access to finance, commercial and technical skills, improved mechanisms for supply chain and development within the maize value chain. Despite the policies and programmes of the government and development partners in maize value chain to strengthen agricultural production and marketing systems, the small and medium scale farmers still lack access to input and output markets for the targeted value chain. Maize input and output markets are still not developed in Nigeria, as there is lack of reliable and sustainable market information system to ensure competitive prices for producers and processors along the chain.

Several programmes and policies have been implemented by the Nigerian Government to improve maize value chain, but all these programmes and policies failed due to exclusion of the value chain actors from project design and implementation. The recent intervention through Commercial Agricultural Development Project (CADP) aggregated beneficiaries into direct and indirect formal groups. Direct beneficiaries are known as the commodity interest groups (CIGs), which include not only small and medium scale farmers but also input suppliers, processors, traders and market associations. However, since the introduction of CADP in 2009, the pertinent

issues of interest have been on the involvement of the commodity interest groups (CIGs) given their roles and operations in maize value chain in Nigeria. Other issues, which no one looked into are the gender segregation and contributions towards the targeted objective of the project. Again no study has determined the performance of CADP relative to baseline in terms of CIGs' technology and demographic variables, as well as the project performance of the targeted value chain relative to baseline production, processing and sales.

These with other constraints have not been empirically studied so as to be incorporated in the programme for the design of future programmes of commercialization of food enterprises. Again, few studies such as Kolade (2015), Ani (2013), and Salisu (2016) which studied analysis of beneficiaries and non-beneficiaries of CADP on maize cooperative groups in Kano and Kaduna states, impact of CADP on productivity and food security status of maize farmers in Kaduna state, and assessment of CADP in Enugu state respectively were not enough to proffer policies that can strengthen CADP. The various studies covered only one or two of the participating states in the maize value chain as against the three participating states in the maize value chain. Furthermore, little or no work has been done to investigate the level of gender involvement and segmentation supported by the project in the maize value chain. The objectives and tools of analysis used in this study were also different from those that had been used previously by other researchers.

In addition, the methodologies adopted here are different from those of other studies. Multivariate probit model takes an extra step of calculating the correlation of the two variables and including that in the estimation of coefficients. By estimating them together, efficiency is improved over the other methods used in previous studies. The multivariate probit model is

based on the multivariate normal distribution and is recommended in cases of independence among the irrelevant alternatives. According to Kassie *et al.* (2013) multivariate allows error terms (unobserved/unknown factors) to be freely correlated, as was applied to this study. Therefore, this study is structured to close such gap by carrying out a study on the assessment of CADP in Kaduna, Kano, and Enugu states.

1.3 Objectives of the Study

The broad objective of this study is to assess the performance of commercial agriculture development projects (CADP) for maize value chain in Nigeria. The specific objectives are to:

i. describe the socioeconomic characteristics of the commodity interest groups (CIGs) in the targeted value chain;
ii. identify the roles and economic operations in maize value chain in the study area namely Kano, Kaduna and Enugu state;
iii. assess the level of gender involvement and segmentation supported by the project in the targeted value chain;
iv. assess the performance of CADP relative to baseline in terms of CIGs' technology adequacy and demographic variables;
v. assess the performance of maize value chain relative to baseline production, processing and sales;
vi. estimate the socioeconomic factors of the commodity interest groups that influence the production, processing and sales performance of the targeted value chain;
vii. estimate the institutional and socioeconomic factors that affect the availability of CADP's matching grant to commodity interest group in maize value chain; and

viii. examine the factors constraining the implementation of CADP along maize value chain.

1.4 Hypotheses of the Study

The null hypotheses to be tested are that:

i. the socioeconomic factors of commodity interest groups do not significantly influence the production, processing and sales performance of maize value chain in the area; and
ii. institutional and socioeconomic factors cannot significantly explain the probability of fund availability in meeting the matching grants by the different commodity interest groups in maize value chain in the area.

1.5 Justification for the Study

The degree to which maize can enhance smallholder livelihood and contribute to overall economic growth depends on the level of commercialization of the targeted value chain. Assessing the performance of Commercial Agricultural Development Project (CADP) is critical to strengthening maize value chain as it provides CADP beneficiaries with reliable incentives to boost productivity, processing and sales performance. Studying the performance level of maize value chain relative to baseline production, processing and sales will help the officials of CADP, government and other stakeholders in maize value chain to detect the level of improvement in the targeted value chain and devise strategies that will aid to reach the end target of the project. Lapses detected could be corrected for implementation in subsequent years. This will not only be considered as key determinant for driving economic transformation but also as a critical element for fostering innovation in maize value chain as opined by Mmari (2015).

Strengthening maize value chain will depend on the results of this study. Therefore, there is need to examine the performance of CADP relative to baseline in terms of gender involvement and participation supported by the project in maize value chain. As asserted by Marenya, Kassie, Jaleta & Rahut (2015) that market participation requires more than receiving the right incentives but as a precondition needed to have access to technologies, assets and public goods (infrastructure, agricultural extension) in order to produce marketable surpluses. Performance assessment through a value chain approach with strong emphasis on stakeholder participation, especially at the Commodity Interest Groups (CIGs) level, provides an insight into how best the activities of CADP could impact on the farmers and the society. Information on group characteristics will be useful in strengthening and improving the operations of CIGs/CADAs.

It is expected that the study will establish some empirical evidences to support areas that were not covered by similar studies. This study also aims to provide the true situation of the project beneficiaries and contribute to dearth in literature, methodology and policy. Furthermore, the findings of this project will serve as a yardstick for evaluating the methods of implementation of other similar projects.

It is also expected that the study will provide literature materials for students and researchers and provide valuable insights for farmers/those interested in farming to make informed decisions that can improve food production and farm incomes.

The study will also determine those socioeconomic and institutional factors that affect production, processing and sales performance of the targeted value chain. Thus, governments and other policymakers can rely on the results of this study, as it will provide empirical evidence for assessing impact of CADP in Nigeria.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Literature

2.1.1 Agricultural Commercialization

Commercialization is a combination of market oriented production which ensures either of this or both, firstly profit maximization which includes:

- output maximization/ specialization
- input assessment/supply/ input use
- cost minimization/ efficient input allocation

Secondly is market participation which includes:

- Market share/ consumer preferences behaviours/orientation
- Utility maximization
- Product differentiation, safety, price and promotion etc.

Agricultural commercialization refers to the process of increasing the proportion of agricultural production that is sold by farmers in markets (Pradhan *et al.,* 2010).Agricultural commercialization means more than the marketing of agricultural outputs; it means the product choice and input use decisions are based on the principle of profit maximization (Yoon-Donn & Yoon, 2009).Agricultural commercialization, which generally refers to greater interaction and engagement with markets or the market system, is considered to be an important pathway for

development and poverty reduction among smallholder farmers (Coles & Mitchell, 2011).Commercialization is measured at household level as either in terms of gross or net sales measured as the ratio of percentage value of gross marketed output to total farm production (Mather *et al.*, 2013). Commercial agriculture can be defined as the production of both crops and livestock on relatively large scale for market. It is a progression from diversified farming, where the farmers' intention is to produce goods for sale primarily for widespread consumption by others (FAO, 2010).

Commercialization of smallholder production is a process involving the transformation from production for subsistence to production for the market (Sokoni, 2008). Agricultural commercialization refers to as the degree of participation in the output markets with much on cash incomes (Hazell *et al.,* 2007). It is a combination of both market orientation and market participation. Market orientation in this context is defined as agricultural production decision based on market signals while on the other hand, market participation is simply the produce offered for sale and use of purchased inputs. Commercialization is a combination of market oriented production and the actual amount bought from or offered to the market for sale. However, most agricultural commercialization literature makes little distinction between market orientation and market participation (Gebre-mathin & Jaleta, 2010).

2.1.2 Commercialization of agricultural product

Agricultural commercialization means more than the marketing of agricultural outputs; it means the product choice and input use decisions are based on the principle of profit maximization (von Braun *et al* 1991; Pingali and Rosegrant, 1995; Yoon-Donn and Yoon, 2009). Commercial reorientation of agricultural production occurs for primary staple cereals as well as for high value

cash crops. On the input side, commercialization implies that both traded and non-traded inputs are valued in terms of their market value. It is commonly argued that productivity growth in smallholder agriculture will require a more commercialized orientation. With the ever increasing population and the limited farmland, increasing productivity will increasingly entail the intensification and commercialization of smallholder agriculture, involving more intensive use of productivity enhancing inputs, and more market oriented patterns of crop production. Empirical evidences indicate that commercialization of smallholder farmers has the potential to enhance incomes and welfare outcomes and take them out of poverty if constraining factors such as lack of capital, farming and commercialization skills, high transaction costs, lack of infrastructure, lack of information and lack of education could be eliminated (Lerman, 2004). Promoting agricultural commercialization is a basis for rural development and poverty reduction although its impact is dependent on the local context and policy environment. A review of case studies conducted in ten countries in Africa, Asia and Latin America found that commercialization increased household income as a result of increased labor and land productivity as well as increased employment opportunities for hired labor (von Braun and Kennedy, 1994). In most cases, increased incomes resulting from commercialization led to increased food consumption (Bouis, 1994) and improved nutrition (Kennedy, 1994).

Because of opportunities in the changing environment of the world such as demand growth due to population growth, urbanization and income growth as well as changing consumer tastes and lifestyles then the future of agricultural commercialization is still bright, providing vital changes for growing income and alleviation of poverty (Zhou et al., 2013). Commercialization is not restricted only to cash crops as traditional food crops are also frequently marketed to a considerable extent (von Braun et al. 1994; Gabre-Madhin et al., 2007). Commodities

traditionally considered as food crops may increasingly be marketed during the transformation process as households specialize. The commonly accepted concept of commercialization is, therefore, that commercialized households are targeting markets in their production decisions, rather than being related simply to the amount of product they would likely sell due to surplus production (Pingali and Rosegrant 1995). In other words, production decisions of commercialized farmers are based on market signals and comparative advantages, whereas those of subsistence farmers are based on production feasibility and subsistence requirements, and selling only whatever surplus product is left after household consumption requirements are met.

2.1.3 Commercialization principles and relationship with agricultural development

According to conventional wisdom, the transition from subsistence (or semi-subsistence) to commercial agriculture represents a key ingredient for the economic development of low-income countries. By exploiting comparative advantages, agricultural commercialization enhances trade and efficiency, leading to economic growth and welfare improvement at the national level. This is further expected to initiate a virtuous cycle which raises household income, thus improving consumption, food security and nutritional outcomes inside rural households. (Calogero *et. al*., 2017)

Commercializing smallholder agriculture is an indispensable pathway towards economic growth and development for most developing countries relying on the agricultural sector (von Braun 1995; Pingali and Rosegrant 1995). According to Moti et al., (2009), demand for modern technologies promotes the input side of production and facilitates the development and advancement of technological innovations. In turn, the use of modern technologies can result in higher productivity and production entering markets. Agricultural commercialization tends to

generate more household income due to its comparative advantages over subsistence production (Kennedy and Cogill 1987; Dorsey 1999). However, unless rural markets are well-integrated and risks are low to influence household decision behaviour, the shift from subsistence to commercial crop production may have an adverse consequence by exposing households to volatile food market prices and food insecurity. Different case studies in Africa demonstrate that household income increases as farm resources are reallocated from subsistence to commercial crops (von Braun et al. 1994). Dorsey (1999) showed that households who followed a commercial specialization scheme earned significantly higher annual net income than others. In some cases, commercialization may be planned, but in most cases it is likely to be spontaneous.

Whether a smallholder commercialization process creates more employment opportunities in rural areas is subject to the nature of commodities produced, technologies used in the production process, and whether agricultural processing is involved in the scheme (von Braun et al., 1994). Usually it is believed that high-value cash crops are labour intensive in their production and targeting these crops in the commercialization process helps to absorb surplus family labour. Commercialization is assumed to enhance household income which helps to purchase a diversified mix of goods and services (like health care, better housing etc.), or increase the current market basket (Kennedy 1994). Second, through the income–food–consumption linkage, commercialization is assumed to increase the food intake of household members, which could improve their nutritional and health status (Kennedy 1994).

2.1.4 Commercial Agriculture Development Project (CADP)

Commercial Agriculture Development Project(CADP) is a comprehensive five-year Project developed by the Federal Ministry of Agriculture and Water Resources (FMAWR) in collaboration with the World Bank and other stakeholders: International Development Agency (IDA), State Governments and the farmer-beneficiaries otherwise called the Commodity Interest Group (CIG) (CADP, 2009).The Project was implemented in five States of the Federation, namely (Cross Rivers, Enugu, Kaduna, Kano and Lagos) along eight value chains. The total number of direct beneficiaries is estimated at 50 000(that is 10 000 beneficiaries per State) over a period of five years (2009-2013), and revised till 2017.

Commercial Agriculture Development Project (CADP) is aimed to improve Agricultural production in Nigeria by supporting the commercialization of agricultural production, processing and marketing of outputs among small and medium-scale commercial farmers and agro-processors (CADP, 2012). Small and medium commercial farms benefit directly, while many households benefit indirectly through access to farm roads, energy, market opportunities and other spill-over efforts. The beneficiaries are already aggregated into informal commodity interest groups (CIGs). The Project supports three value chains per State. These are Cross Rivers (oil palm, cocoa and rice), Enugu (fruit trees, poultry and maize), Kaduna (Fruit trees, Dairy and maize), Kano (Rice, Dairy and maize) and Lagos (poultry, aquaculture and rice) (Kolade, 2015).

The objective of the Commercial Agriculture Development Project for Nigeria is to strengthen agricultural production systems and facilitate access to market for targeted value chains among small and medium scale commercial farmers in the five participating states (Lagos, Kano, Kaduna, Enugu, and Cross River).

These value chains are: oil palm, cocoa, fruit trees, poultry, aquaculture and dairy, with maize and rice as staples. The key performance indicators for CADP are: (i) 25% increase in total production and processing of targeted value chains among participating small and medium scale commercial farmers (disaggregated by rice, oil palm, cocoa, fruits trees, poultry, aquaculture, dairy and maize). (ii) 25% increase in total productivity and processing of targeted value chains among participating small and medium scale commercial farmers (disaggregated by rice, oil palm, cocoa, fruits trees, poultry, aquaculture, dairy and maize). (iii) 30% increase in volume of sales of agricultural products under the targeted value chains among participating small and medium scale commercial farmers (disaggregated by rice, oil palm, cocoa, fruits trees, poultry, aquaculture, dairy and maize). In Enugu State, pineapple was considered among the fruit trees because the state has comparative advantage on it over other fruit tree and there are existing pineapple plantations while there were none established among those popular fruit trees like mangoes, guava, oranges etc. as is the case in Kano and Kaduna States.

Based on an evaluation of market equivalents during appraisal, the value chains selected are expected to have high demand while the markets have the capacities to absorb the additional production. The small and medium-scale farms are heterogeneous with respect to households' assets, human capital, income generating potentials, and livelihood strategies requiring differentiated strategies for their value chains. The number of direct beneficiaries is modest relative to the overall size of the project, and corresponds to investment per beneficiary of approximately US$3,700. Clearly, an investment of this magnitude will be difficult to justify if the benefits were restricted to those directly participating. However, in addition to the direct beneficiaries, others will gain from the improved roads and power made possible under the project. The eligibility criteria for beneficiary participation are (i) having been engaged in

farming business for at least three years; (ii) being involved in one or more activities along the selected value chain; (iii) having revenue of at least N300,000 a year; (iv) belonging to relevant CIG; (v) being located in a participating state; and (vi) availability of funds for own contribution to the matching grants (CADP Working Documents ―Project Implementation Manual - PIM and Project Appraisal Document – PAD, 2009).

The project has two components, namely: (i). Agricultural Production and Commercialization; and (ii). Rural Infrastructure. Agricultural Production and Commercialization component provides resources to facilitate the adoption of appropriate and existing agriculture technologies. It will also support staple crop production systems to complement the country's food security initiatives and develop domestic and export markets. The activities supported under this component will focus primarily on the selected value chains. The component has four sub-components namely, **i.** technology demonstration and adoption, **ii.** support to staple crop production, **iii.** market facilitation and **iv.** capacity building. Technology Demonstration and Adoption sub-component help to finance (i) demonstration and dissemination of technologies in the selected value chains to be provided by a mixture of existing potential service providers from the public (i.e. research institutes and Agricultural Development Programs (ADPs) and private sectors. (ii) Matching Grant: The project will provide matching grants to support public goods elements under staples to be applied on 50: 50 basis with the project beneficiaries at the CIGs and Commercial Agriculture Development Associations (CADAs) levels. This is a one-time Capital Grant for investments needed to improve the adoption of existing agricultural technologies by participating commercial farmers. The matching grant is to support the adoption of known and superior technologies and build capacity of small and medium-scale commercial agriculture farmers. This will enable them to take advantage of market opportunities for their

produce. The matching grant is open to all qualified/eligible CIGs and/or members of Commercial Agriculture Development Associations (CADAs). Four sets of criteria will guide the selection of proposals, and these are: viable technology, public goods element and economic and financial viability. For adoption of new technologies, the formula for the matching grant will be 50% to 20% contribution from IDA on a sliding scale at the association level (CADP Working Documents ―Project Implementation Manual - PIM and Project Appraisal Document – PAD, 2009). In the case of the staples it will be a ratio of 50% IDA and 50% contribution by the beneficiaries (CIGs/CADAs) on activities that do not have public goods element (roads and energy). This is a one-time Capital Grant for investments needed for adoption of existing and new technologies by participating commercial farmers. The matching grant is to support the adoption of known and superior technologies and build capacity of small and medium-scale commercial agriculture farmers. This will enable them to take advantage of market opportunities for their produces. The grant will serve as a catalyst to spur investments in commercial agriculture. Therefore, the overarching majority of the activities 'financing has to be from own/non-grant sources, mobilized through either savings or loans. The matching grant is open to all qualified/eligible members of CIGs and/or CADAs. Four sets of criteria will guide the selection of proposals, and these are - viable technology, public goods element, and economic and financial viability. Investment proposals to be supported with matching grants will range from 50% to 80% contributions from the beneficiaries. The mechanism for determining the level of the matching grant aims at ensuring that the recipient CIGs/individual members invest in viable businesses and activities, whether jointly in a single enterprise or in sub-groups in several activities. Efforts were made to ensure that the grant has an impact on a wider society than the immediate recipient farmers and demonstrate clear long-term economic and financial viability.

Investments above N5.0M (about US$42,000 equivalent) are considered large and excluded from support grant. It is expected therefore, that the grant will be less attractive and thereby minimize elite capture.

The matching grant is open to all qualified/eligible members of CIGs and/or CADAs. The entities should be financially sustainable with capacity to initiate and implement acceptable/viable proposals. CIGs must belong to CADAs and must show evidence of funds (including own funds or other sources) to match the grant. The eligible beneficiaries should have the following attributes: (i). the farmer/beneficiary should be engaged in commercial agriculture production, (ii). should be member of a CIG for at least 6 months, and (iii). the CIGs should be members of the CADAs. The individual farmers and the CIGs will collectively identify specific investments that will improve their operations. Subsequently, each individual farmer produces a proposal showing (a) the total cost of proposed investment and (b) documentation showing details of sources of own funds (i.e., total cost of proposed investment less matching grant). The individual plans are of varying sizes both in terms of size of investments and the level of matching grant. The CIG aggregates them, and checks each item against a list of possible technologies eligible for support. The CIG application then goes forward to the CADA. Another round of aggregation takes place at the CADA level. The CADA checks the submissions of the CIGs to be sure that all are complete, approves and then submits them to the project state commercial agriculture development office (SCADO) for clearance and payment consideration. In addition, spot audits ex-post will be undertaken by CADAs and SCADO to confirm that the grants are utilized for the intended purpose. The approved business proposals are sent to the Project Financial Management Unit (PFMU) through SCADO with an instruction to make payments directly to the Service Providers (SP). The Service Provider supplies the technology

needs of the CIG once the eligible CIG meets its financial obligations. The same process will also be followed if the needs of the CIG are capacity building for accessing technology or to take advantage of market opportunities. The flow of funds for the grant scheme is presented in Figure 2.1:

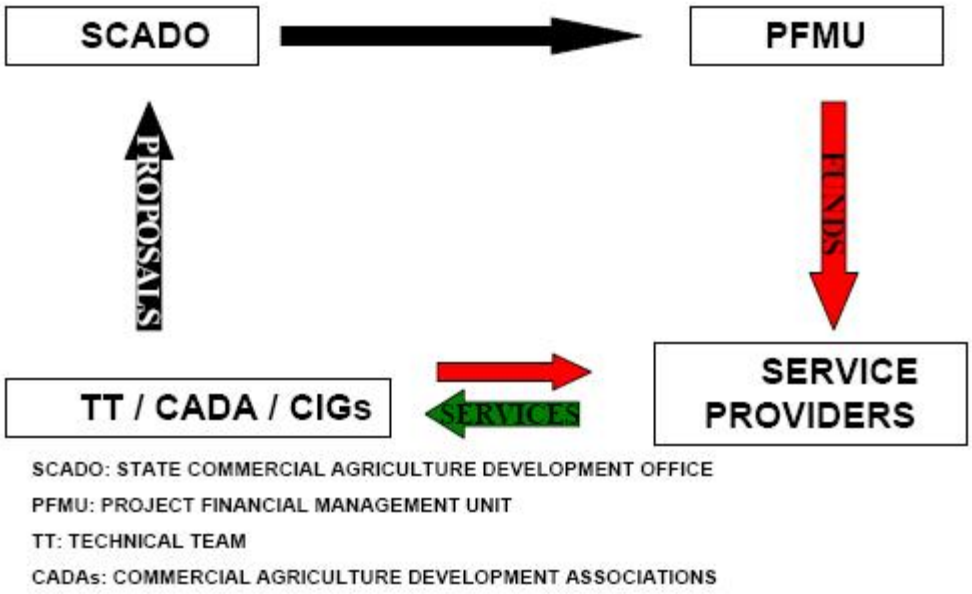

Figure 2.1 Flow of Funds for the CADP Grant Scheme

Source: Ani (2013)

Operational modalities of the Matching Grant Scheme, including its management and disbursement arrangements are – (1). The project will maintain a register of approved Service Providers (SPs); (2). SCADO enters into an agreement with the registered SP and prepare a Memorandum of Understanding (MOU) on specific services/goods to be delivered to the beneficiaries; (3). The beneficiary pays his/her own contribution for the procurement of the goods/services to the identified Service Provider after sub-project approval; (4). The Service

Provider confirms to SCADO that the beneficiary has made such payments; (5). SCADO instructs the Service Provider to provide the service/works/goods to the beneficiary; (6). Beneficiary and Service Provider confirm to SCADO the service/works/goods have been provided and (7). SCADO processes for payment of IDA contribution directly to the Service Provider through the PFMU (CADP Working Documents ―Project Implementation Manual - PIM and Project Appraisal Document – PAD, 2009).

2.1.5 Concept of Participation

Rubin and Rubin (2014) stated that participation serves as a tool for educating citizens, enhancing their skills, and empowering them. It offers a way to impact decisions that have an impact on people's lives and is a channel for transferring political authority. Nevertheless, it can also be used to assimilate opposing views and ensure that social services are responsive, sensitive, and accountable to the public. Participation has also been defined as the ability of the people to choose voluntarily to be integral parts of a development process (Agwu, Anyanwu & Oriuwa, 2014). A descriptive definition of participation programs would imply the involvement of a significant number of persons in situations or actions that enhance their well-being, for example, their income, security or self-esteem (Akintobi et al., 2012).

There are many logical arguments for beneficiary participation in development projects. First are the economic justifications. Public participation will mobilize greater resources and accomplish more with the same project budget. It is also economically efficient in that it uses generally under-utilized labour and, to a lesser extent, can build upon indigenous knowledge which also tends to be under-utilized. Thus more services are provided at less cost. Participation leads to better project design. Participation ensures that felt needs are served. A sense of immediate

responsibility and ownership by beneficiaries puts pressure on a project to be truly worthwhile. Participation creates local-level awareness, competence and capacity where it did not exist before (Kurt & Warren, 1987).

Participation in farm programs typically is voluntary. An individual farmer will participate only if the additional benefits exceed the costs of participation. Costs and benefits will differ between individuals depending on specific characteristics of farm as well as the farm family, some of which, however, may not fully be observed. We should not expect to find the response to farm programs to be homogenous across individual farms. The existence of systematic differences between program participation (causal effect) from the effect of initial differences in characteristics of the two groups (selection effect). To distinguish between the two effect, an evaluator has to answer the question: 'How much did farms participating in the programme benefit compared to what they would have experienced without participating in the programme?' The fact that this counterfactual situation cannot be observed constitutes the 'classical evaluation problem' (Pufahl, 2008).

The term 'participation' can be used in many different ways and is often used interchangeably with words such as involvement, engagement or prefixed with civil, community or public activities. There are three broad categories of community participation (Brodie *et al.,* 2009):

i. Individual – signing petitions, boycotting products (Brodie *et al.,* 2009), neighborliness, 'doing a favour' (Williams, 2011)
ii. Community or social participation – being a member of a community group, association, club, volunteering, running a church group

iii. Public participation – this can also be referred to as political or civic and includes voting in elections, taking part in consultations or being a local councilor.

The fundamental principle of community participation is to provide local residents with the chance to be involved in programs, have a say in decision-making, and actively engage in matters that affect them. The underlying idea behind involving local people at all project stages is that their participation for a common goal ultimately benefits them. Nevertheless, it's crucial to recognize that socio-cultural barriers and power dynamics at lower levels can significantly shape and, at times, dictate the extent of participation (Begum, 2015). According to Kyamusugulwa, (2013) community participation serves as an indicator of people's involvement in either decision making in a project or its implementation. Muniu et al, (2018) noted that community participation in development projects leads to sustainable results. Wedchayanon and Chorkaew (2014) proposed that to facilitate direct community engagement in development initiatives, projects should prioritize a people-centered approach.

Government official and experts support the idea of participation in principles but at ground level there is no common agreement while Blay *et al.* (2008) found that not involving target group or local knowledge has weakness such as solutions which are based on limited understanding of process, limited technical knowledge and dissemination of results may be limited to gender or specific socio-economic groups.

Who does and does not participate is highly consequential for constituting which people and interests are considered part of the public domain and for people's sense of rights and entitlement as members of a public (Disch, 2012). Moore (2014) makes the argument that in a democracy a "public" collectively defined through democratic processes- that inevitably involve direct or

indirect participation of some kind is the appropriate arbiter of public value when government-owned assets are involved. Despite participation becoming a routine part of government policy-making, there is nonetheless a growing sense that government is unresponsive or not representative of many segments of the public or perhaps even in the majority (Jacobs, 2014).

Community participation requires involvement of community members in projects that address their issues. Meaningful community participation extends beyond physical involvement to include generation of ideas, contributions to decision making, and sharing of responsibility. Among the factors that motivate people to participate are the desire to play an active role in bettering their own lives, fulfilling social or religious obligations, feeling a need for a sense of community, and wanting cash or in-kind rewards. Whatever people's motivations, obtaining meaningful community participation and having a successful, sustained initiative require that engagement leaders respect, listen to, and learn from community members. An absence of mutual respect and co-learning can result in a loss of time, trust, resources, and, most importantly, effectiveness (Bretty, 2013).

2.1.6 Project/Programme Performance Concept

A project is considered as a temporary effort in organizations that is structured to perform a set of activities for creating a unique result with a predetermined beginning and end defined by time boundedness and limited resources. According to Project Management Institute (2017), "a project is a temporary endeavor undertaken to create a unique product or service". Project performance denotes the extent to which project outputs and outcomes satisfy budget goals, schedule goals, operational and technical specifications, and ultimately, the business needs of the clients (Ali et al., 2018). Some projects form part of programmes, whilst others do not.

A programme is a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. Programmes thus consist of multiple projects. During the lifespan of a programme, projects can be added to the programme or removed as the overall strategy becomes clearer. Overall expenditure on programme is typically significantly greater than that for projects. These efforts will also consume significant amounts of funding which can translate into hard choices about whether to continue or discontinue programmes or certain aspects of them. A programme is therefore likely to involve a number of different departments or functions within the organization and can span several years (PMI, 2013)

The traditional approach associated with the performance of a project includes the evaluation of scope, quality, and cost. Indeed, the process of measuring the action leads to quantifying project performance which is considered as efficiency and effectiveness of action in the context of projects (Glodzinski, 2019). Project Performance is considered as a trade-off between several measurements and dimensions specifically emphasizing what is done, such as scope and quality versus, the resources such as time and cost used to do the project activities (Kabirifar &Mojtahedi, 2019).

According to the 1994 Standish CHAOS Report, the top 5 factors found in successful projects include:

i. User involvement,
ii. Executive management support,
iii. Clear statement of requirements
iv. Proper planning
v. Realistic expectation

The report concludes that these were the elements that were most often pointed to as major contributors to project success. These elements alone do not guarantee success, but if these are done well, a project, according to the Standish Group, will have a much higher probability of success.

The Standish Group also outlined all the top factors found in failed projects and they include

i. Incomplete Requirements
ii. Lack of user involvement
iii. Lack of Resources
iv. Unrealistic Expectations
v. Changing Requirements & Specifications
vi. Lack of Planning
vii. Lack of IT management
viii. Technical Illiteracy

2.1.7 Target Performance Concepts

According to National Treasury (2007), once a set of suitable indicators has been defined for a programme or project, the next step is to specify what level of performance the institution and its employees will strive to achieve. This involves specifying suitable performance targets relative to current baselines.

The baseline is the current level of performance that the institution aims to improve. The initial step in setting performance targets is to identify the baseline, which in most instances is the level of performance recorded in the year prior to the planning period. So, in the case of annual plans,

the baseline will shift each year and the first year's performance will become the following year's baseline. Where a system for managing performance is being set up, initial baseline information is often not available. This should not be an obstacle - one needs to start measuring results in order to establish a baseline. Performance targets express a specific level of performance that the institution, programme or individual is aiming to achieve within a given time period.

According to United Nations (2013), to qualify as a target the problem must be preventable or a way out of it is found through interventions in agriculture and food systems. A study by Adolph *et al*., (2013) concluded that targets for agriculture and food systems need to encourage systematic solutions for making food production, processing, trade and distribution more sustainable, equitable and resilient, thus also contributing to nutrition and other outcomes.

2.1.8 Programme/Project design, Implementation and Performance

According to International Labour Organization Project Design Manual (2010), every project has to follow a series of phases, allowing the process to be guided from the moment the problem is identified until it is solved. This series of phases is known as the project cycle. Project Cycle Management (PCM) is a results-based decision-making tool. Each phase is crucial and should be fully completed before going on to the next. Programming new projects will draw on the final evaluation in a structured process of feedback and institutional learning.

Design is the starting point of the project cycle. Project design provides the structure of what has to be achieved, how it is to be implemented and how progress will be verified. Therefore, the design is the most crucial phase. Its quality will influence the stages in the project cycle.

Too often, little time is devoted to this phase due to scarcity of resources. Designing a project requires an upfront investment. Nevertheless, the less people are willing to invest in designing their project, the higher the risk of compromising its quality when the time for implementation comes. In the case of resources, it is best to allocate a considerable amount to this stage, which can facilitate and improve the quality of analysis and identification of real needs. If financial resources are not available, time is still an important factor, one that can, for instance, contribute to cohesion among stakeholders and familiarity with the context and its main problems and challenges.

The project cycle management approach helps to ensure that:

- projects are relevant to the real problems of the target groups and make the most of existing opportunities;
- projects are feasible: objectives can be realistically achieved within the constraints of the external environment and capacities of the organization;
- the benefits generated by the projects are sustainable;

Although this may differ according to the procedures established by each donor agency, the project cycle generally has the five phases described in Figure 2.2

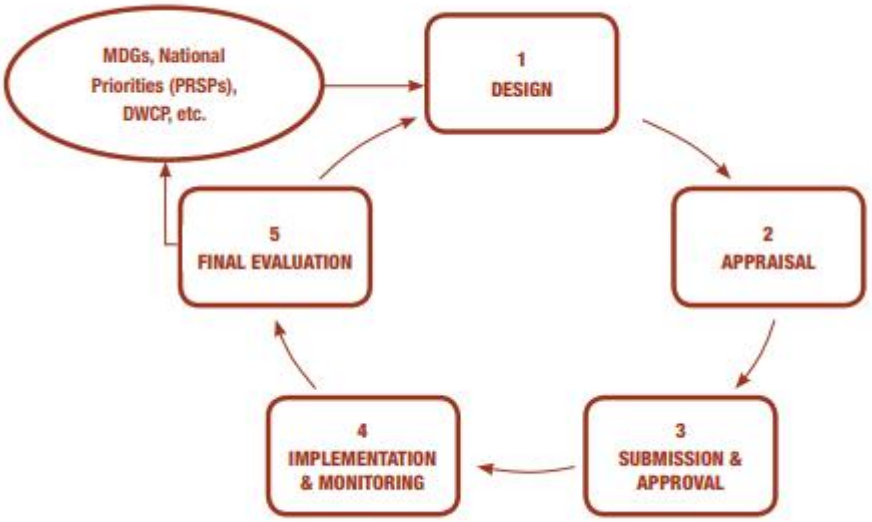

Figure 2.2: The Project Cycle

Source: **International Labour Organization (2010)**

Phase 1- Designing your project: analyzing the situation, formulating your strategy and structure, preparing your implementation plan and planning a Monitoring & Evaluation system.

There are four subsequent steps to follow in order to design a good, simple and feasible project:

i. Project Identification;

ii. Project Formulation;

iii. Implementation Planning; and

iv. Planning of monitoring and evaluation.

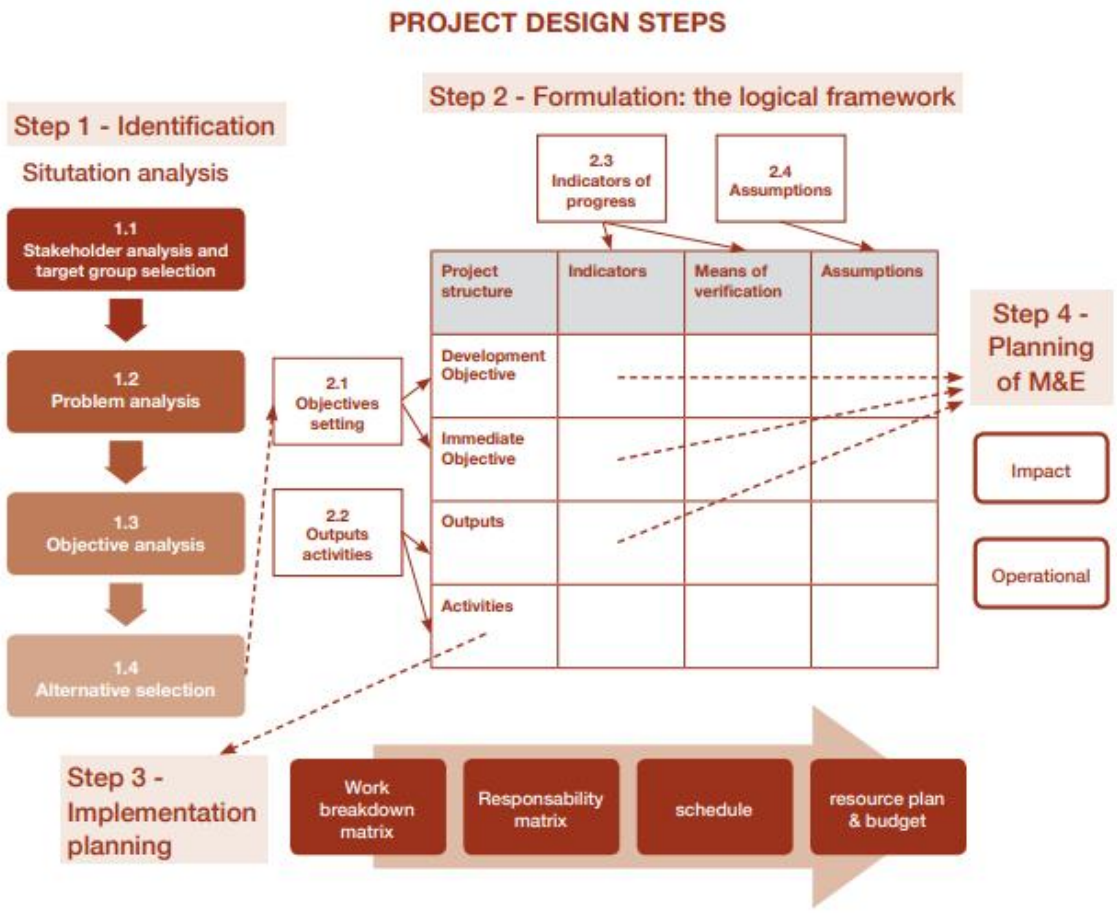

Figure 2.3: Project design steps

Source: International Labour Organization (2010)

Step 1 - Identification is a participatory consultative process that analyses the situation and the problem.

Step 2 - Once the situation has been analysed and understood, the team in charge of the formulation of the project should establish concrete outcomes (objectives and outputs) to achieve, and outline the actions to be taken and the resources needed. It should also establish proper indicators for each objective.

Step 3 - Then, an implementation plan will be devised, based on the logical framework, in order to have both a results-based work plan and a budget.

Step 4 - Finally, your monitoring & evaluation system will be planned and budgeted for.

Phase 2 - Appraising your project

The appraisal is part of project quality control. It is an analytical assessment of the design to ensure that technical and design standards have been met and that the proposal is consistent with the cooperative's strategic or business plan, the priorities of national development frameworks, and the donor criteria before it is presented to a donor to mobilize extra resources for specific projects.

Quality control is integrated into the entire project cycle by various means. It should therefore start at the beginning of the design. The project designers must keep quality criteria in mind and must have an appraisal done before submitting the proposal. During the implementation phase, the monitoring and evaluation system ensures that the project stays on track.

Projects are periodically evaluated to determine the level of achievement of the project objectives during the project and upon completion. Thus, appraisal is one of the quality control mechanisms within the project cycle.

Phase 3 - Submission of the project proposal to the donor, and approval

Once the project document has been formulated, it is submitted to the donor for appraisal. If approved, a contract will be signed and the project document annexed with the budget and

timeline. The objectives should be achieved within the budget and deadlines listed in the document.

Phase 4- Implementation and monitoring of the project

This phase is the concrete implementation of the activities planned in the approved document. The work plan (or implementation plan) is generally prepared at the formulation stage in order to assess its feasibility and plan the needs in terms of human resources, financial resources and time before submission to the donor. In some cases, the work plan will only be prepared if not done at the formulation phase or adjusted.

Monitoring takes place throughout the project. It is an internal, participatory process. It allows the cooperative or cooperative support organization to see whether the outputs are being achieved and the resources efficiently and effectively used and to take corrective action when needed. In some cases, the project's management, cooperative members or stakeholders may decide that the original design was unrealistic, the internal structure or the budget irrelevant or the management incompetent.

Phase 5 - Final evaluation of the project

This is generally conducted at the end of the project to see whether the planned benefits were achieved. Lessons learnt are underlined and could be documented so that they can be replicated or scaled up and integrated into future cooperative development strategies and project.

2.1.9 CADP Baseline Survey

The National Bureau of Statistics (NBS) and the Commercial Agriculture Development Project (CADP) which is a World Bank investment program in Nigeria, collaborated to conduct the Baseline survey report in 2010. The purpose of the survey was to gather information on the initial conditions of the CADP results for households that participated and those that did not participate, which will be used to assess the CADP's impact in operational states. The study focused on various crops including oil palm, cocoa, fruit trees and maize. Additionally, poultry production, livestock (dairy) and fishery were among the activities considered under the CADP.

The aim of conducting the CADP baseline survey was to gather baseline data and information for future impact assessment of the project on its beneficiaries. The survey was carried out in the five participating states between December 2010 and February 2011, following a household listing exercise for households involved in value chains relevant to the project. Specific objectives are to estimate:

- output level of CIGs for target value chain commodities
- average yield of CIGs for target value chain commodities
- net Sales for target value chain commodities
- adoption rate of Technologies for target value chain commodities
- CIGs access to product market & market information
- travel time from farm to market for CIGs
- transportation cost for agricultural products
- CIGs' Connection to electricity

2.2 Theoretical Framework

2.2.1 Social Change Theory

Theory of change (Weiss, 1995) is an explicit process of thinking through and documenting how a program or intervention is supposed to work, why it will work, who it will benefit (and in what way) and the conditions required for success. A theory of change is typically (but not always) developed in the design phase of program development and it is built on evidence, beliefs and assumptions (Jones & Rosenberg, 2018).

Within evaluation practice, Theory of Change emerged in the 1990s at the Aspen Institute Roundtable on Community Change as a means to model and evaluate comprehensive community initiatives. Notable methodologists, such as Huey-tsyh Chen, Peter Rossi, Michael Quinn Patton, Helene Clark, and Carol Weiss, had been thinking about how to apply program theories to evaluation. In the book, "New Approaches to Evaluating Comprehensive Community Initiatives", Carol Weiss hypothesized that a key reason complex programs are so difficult to evaluate is that the assumptions that inspire them are poorly articulated. She argued that stakeholders of complex community initiatives typically are unclear about how the change process will unfold and therefore place little attention on the early and mid-term changes needed to reach a longer-term goal. Weiss popularized the term "Theory of Change" as a way to describe the set of assumptions that explain both the mini-steps that lead to the long-term goal of interest and the connections between program activities and outcomes that occur at each step of the way.

Social change is defined as the significant alteration of social structures including consequences and manifestations of such structures embodied in norms, values and cultural products and

symbols. Moore (1963) stressed that the essence of human life is change; development and growth. They are often used interchangeably to associate the dynamics of society with progress. The change could be retrogressive which refers to change in an undesirable direction or progressive-meaning in a desirable direction. Adekoya and Tologbonse (2005) stated that the only thing that is permanent is change because it is always taking place as everyone adjusts to one thing or the other every time. Social change involves any change in values, norms, sound ideas, habits, obligations of people or change in lifestyle, life goals chances and environment or in the composition or organization of their society (Ekong, 2003). Change may occur in the replacement of ideas. In some societies, the scientific techniques of agriculture replace traditional ideas and techniques of farming (Ekong, 2003).

A theory of change is a method that explains how a given intervention, or set of interventions, is expected to lead to specific development change, drawing on a causal analysis based on available evidence. According to the United Nations Development Assistance Framework (2017), a theory of change helps to identify solutions to effectively address the causes of problems that hinder progress and guide decisions on which approach should be taken, considering United Nation comparative advantages, effectiveness, feasibility and uncertainties that are part of any change process. A theory of change also helps to identify the underlying assumptions and risks that will be vital to understand and revisit throughout the process to ensure the approach will contribute to the desired change. A theory of change is important as development challenges are complex, and are typically caused by many factors and layers that are embedded deeply in the way society functions. A theory of change will also provide a framework for learning both within and between programing cycles.

The social impact assessment perspective involves the application of the knowledge of sociology and other social sciences in attempt to predict the sociological effect of environmental alterations by development project. The theory emphasizes on the process of assessing or estimating, in advance, the social consequences that are likely to follow from specific policy actions or project development, particularly in the context of appropriate national, state, or provincial environmental policy legislation (Kolade, 2015). The theory includes all social and cultural consequences to human populations of any public or private actions that alters the ways in which people generally cope as members of society. Cultural impacts involve changes to the norms, values, and beliefs of individuals that guide and rationalize their cognition of themselves and their society. In general, the social impact assessment perspective process provides description in understanding, managing, and controlling change; predicting probable impacts from change strategies or development projects that are to be implemented; identifying, developing, and implementing mitigation strategies in order to minimize potential social impacts that may develop as a result of the social change; evaluating social impacts caused by earlier developments, projects, technological change, specific technology, and government policy. This theory is therefore relevant to this study in the sense that it will help in the understanding of the social realities which demonstrates the change that has taken place in commercial agriculture development (Kolade, 2015).

2.2.2 Value Chain Theory Jungle (VCTJ)

Tens of concepts are related to *value chain*, among which the ones with prefix *value* form a *value tree* and the ones with postfix *chain* converge on a *chain tree* while dozens of theories build up a *value chain tree*. In short, Value Chain Theory Jungle (VCTJ) is a theory family which embodies *chain tree*, *value tree* and *value chain tree* as shown in Figure 2.4 (Wang & Li, 2009).

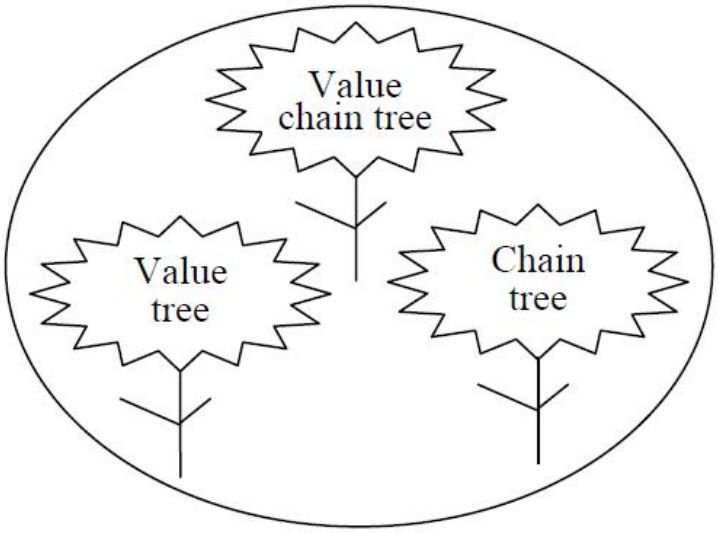

Figure 2.4: Component structure of VCTJ.

Source: Wang and Li (2009)

Some popular theories in academia and industrial circles are classified and listed in Table 2.1

Table 2.1: List of the Theories

iVCTJ.

Value tree	Chain tree	Value chain tree
Value stream	Supply chain	Physical value chain
Value chain	Demand chain	Virtual value chain
Value cluster	Enterprise chain	Job value chain
Value constellation	Industrial chain	Enterprise value chain
Value network	Regional chain	Industrial value chain
Value system	Profit chain	Space value chain
Value engineering	Knowledge chain	Supplier value chain
—	Market chain	Sale value chain
—	Service chain	Customer value chain
—	Value chain	Global value chain

Source: Wang and Li (2009)

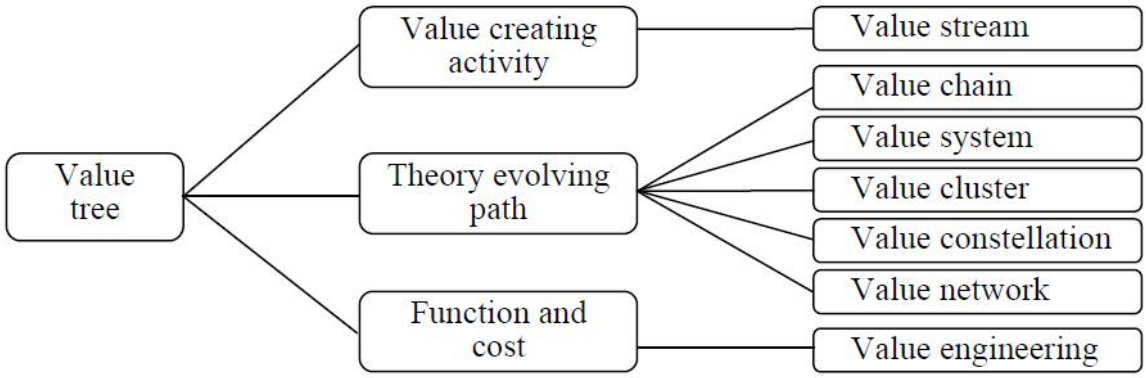

Figure 2.5: V*alue creating activity*, *function and cost*, and *theory evolving path*.

Source: Wang and Li (2009)

Wang and Li (2009) argued that the growth of the three theory trees results from scholars' different research views, which are analogous to branches of a tree. The value tree has three views: value creating activity, function and cost, and theory evolving path as shown in Figure 2.5.

The chain tree has four views, which are enterprise interior and exterior, enterprise extension direction, form of value representation and form of organization as shown in Figure 2.6. In the same way, value chain tree has four views: research scope and focus, form of existence, vertical development stage and extra-organizational expanding direction shown in Figure 2.7.

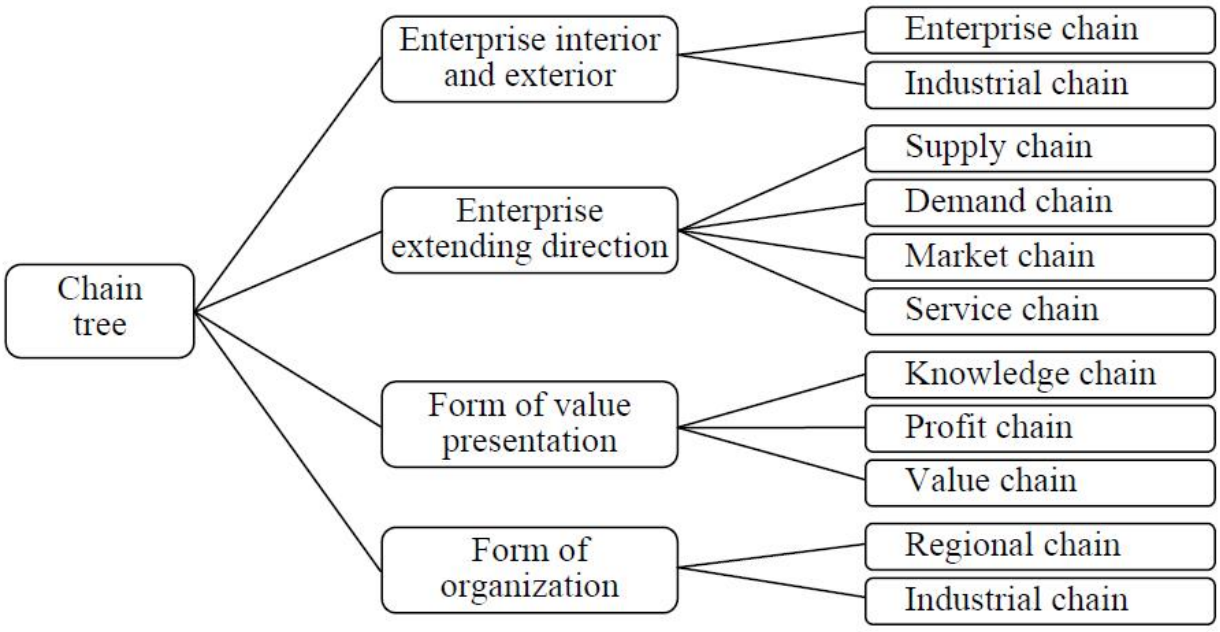

Figure 2.6: Chain Theory Tree
Source: Wang and Li (2009)

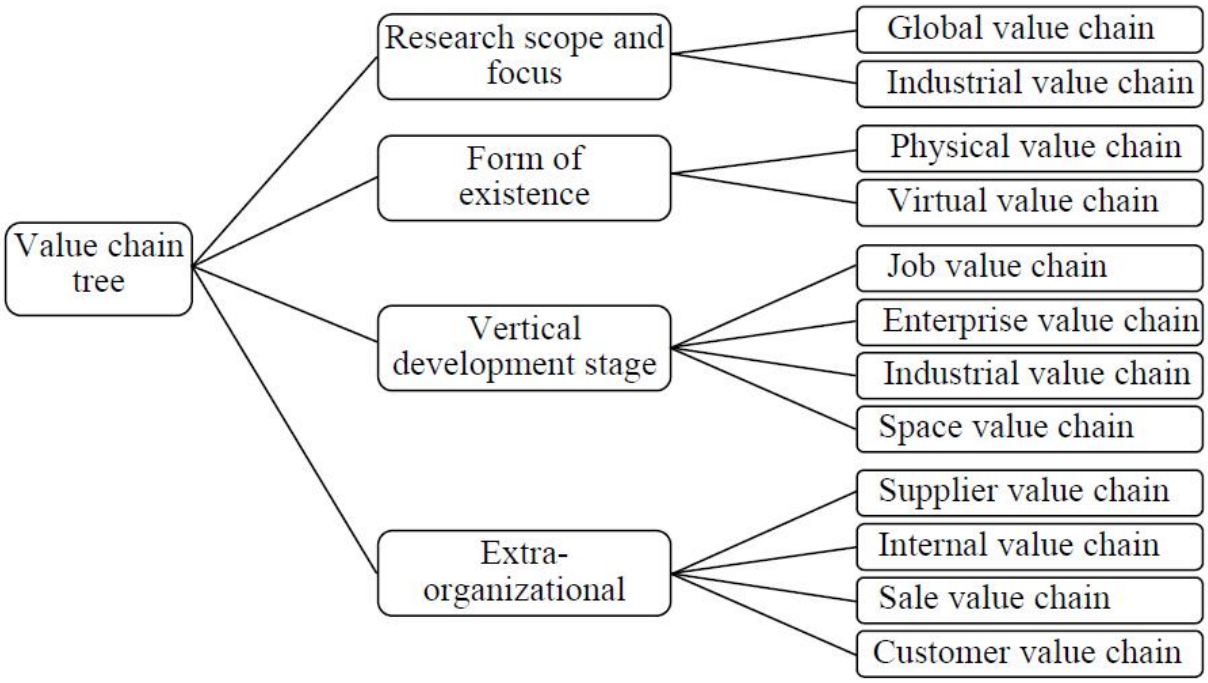

Figure 2.7 Value Chain Theory Tree
Source: Wang and Li (2009)

The term value chain was first popularized in a book published in 1985 by Michael Porter, who used it to illustrate how companies could achieve what he called "competitive advantage" by adding value within their organization. Subsequently the term was adopted for agricultural development purposes. Value chain analysis does not stop at the level of the actors or groups of firms, producers or market actors. It also draws attention to the national system of innovation—the network of institutions which support economic actors (Kaplinsky & Morris, 2002*).* The term 'chain' denotes the fact that most goods and services are the result of a series of activities at domestic, national or international level. Value chains can either be market driven or relation-based depending on the form of governance they adopt (Farnworth, 2011).

The three concepts *supply chain*, *value chain* and *industrial chain* are the most popular concepts in China, which leave the other concepts far behind. Industry is leading academy on the research

of *industrial chain*. In Chinese industrial circle, the top three focuses are *industrial chain*, *supply chain* and *value chain* in descending order, but the research on *industrial chain* is not the number one in Chinese academia. It can be discovered that *value chain*, *supply chain* and *industrial chain* are developing at different speeds. In fact, under the IT manufacturers' vigorous propaganda, supply chain turns to emphasize how to enhance the relationship among circles by means of techniques (Fawcett et al., 2006). The current developing status shows that the research on *supply chain* has surpassed that of *value chain* all round (both industrial concern and academic research), and the research on *industrial chain* is drawing ahead of that of *value chain* too. All these truths imply the disequilibrium of the development of these three chains. Following the above contrast analysis on the three trees in VCTJ, it is concluded that the research on *industrial chain* and *industrial value chain* collects enormous attention either industrial circle or academia. However, overseas research on these two concepts is nearly at the blank stage (Wang, Li & Jiao, 2007).

2.2.3 The theory of value chain and relationship with commercialization

The value chain consists of a series of activities that create and build value. Value chain can be defined as the full range of activities and participants involved in moving agricultural products from input suppliers to farmers' fields, and ultimately, to consumers (Miller and Jones,2010). Value chain approach presents a good picture of the process of creating value. Value chain analysis helps in understanding the connection among actors in the chain and the way trade takes place (Adeoye et al., 2013). An agricultural value chain is considered as an economic unit of analysis of a particular commodity or group of related commodities that encompasses a meaningful grouping of economic activities that are linked vertically by market relationships

(Getachew,2012). The first step in value chain analysis is mapping of the core processes and activities in the chain (Mmasa and Msuya, 2011). Porter (1985) breaks companies' value chain down into single activities. The method allows the firm to understand which parts of its operations create value and which do not (Ketchen and Hult, 2007). The aim is to cut the entire complicated supply chain of a company into smaller units. Hergert and Morris (1989) state that "the fundamental notion in the value chain analysis is that a product gains value as it passes through the vertical stream of production within the firm. The model was originally introduced for companies in the manufacturing industry (Ketchen and Hult, 2007) which has a significant impact on service firms.

As income and urbanization have increased, the demand for food has also changed from one mainly based on grain to a more diversified diet including meat and dairy products, fruits, and vegetables. The change in demand implies not only a change in the diet composition (away from staples to non-staples) but also a change in the preferences for food characteristics, including an increasing demand for features such as safety, quality, convenience, and organic and processed foods. Different types of organization of the agrifood system are required to accommodate the changing demand for food. Rather than food distribution based mainly on the production, storage, processing, and distribution of durable grains of largely undifferentiated quality, the challenge for the system is increasingly related to perishable products, differentiated products, safety issues, environmental concerns, postharvest problems, and the emergence of a more sophisticated retail system. The gap between farm prices and consumer prices is widening because more affluent and discerning consumers require an increasing number of services and attributes to agricultural products. This offers potential opportunities for farmers to capture higher prices if they are able to engage in value-adding activities.

However, when various value-adding operations are introduced in the supply chain, the gap between farmer and consumer prices increases substantially. The more dynamic the entrepreneurs in the value chain, the more forms of adding value will be found after production and, as a consequence, the gap between farm and consumer prices will increase. A good value chain system results in better commercialization by the rural poor, which translates into greater opportunities for their generation of income, reduced poverty and inequality at the producer level resulting in overall livelihood improvement (Shahidullah and Haque, 2010) which is a prerequisite for social and environmental sustainability (Giuliani et al., 2005). Value chain analysis can be viewed as a more intrusive and comprehensive political technology of commercialization (McMichael, 2013) because it seeks to enrol farmers and nature more firmly into the circuits of capital, the often merely formal subsumption of smallholder farmers of earlier periods of agricultural commercialization is reengineered towards real subsumption.

2.3 Empirical Literature

2.3.1 Socioeconomic Characteristics of CADP Beneficiaries in Maize Value Chain in Nigeria

The study by Lagos State Ministry of Agriculture & Cooperatives, Commercial Agriculture Development Project and World Bank (2013a) on the Environmental and Social Impact Assessment (ESIA) for the Commercial Agriculture Development Projects at the Rice Processing Centre, Idena–Itokin, Epe, Lagos showed that the population of the area rose from 75% in the last decade and is expected by 2015 to be 429,706. The LGA is critically influenced by influx of people from Lagos urban centres as result of high cost of living and urbanization. With respect to sampled individual and household farmers the following features were noted: a

high proportion of young farmers (trainees) comprising people of 18 to 45 years; a high proportion of households and farmers who are yet to marry; a high proportion of households and individual comprising couples with children (2-4); the community of the study area is characterized by low income group including trained farmers and also identified that there was no restriction for female participation. The report further asserted that the project area is a typical rural setting which is very close to a growing yet well-established town. The area is predominantly and traditionally agrarian with agricultural activities such as crop production and fishing. Its main populations are engaged in rural agriculture. The community has no healthcare facility, no primary schools or secondary except the privately owned school which is beyond the reach of a resident farmer in the village. Therefore, dwellers of this area will have to travel to Epe in order to get the services of a medical officer or get education for their children. The report stated that about 81.3% of the respondents noted that the intervention will encourage high productivity and human capital developments of the people, and supported that the projects under LSCADP have positive impacts on the productivity and living standard of fish farmers. The report indicated that The LSCADP contributions to the agricultural development improved access roads for effective movement of the farm input and output; provided fingerling to boost catfish production; improved power supply for domestic and agricultural usage; ensured water supply for domestic and agricultural usage (activities of fishery), and created job through requirement for extension workers and services, farm input and output (distribution), etc.

Kolade (2015) found that the mean ages of maize farmers' cooperative group beneficiaries and non-beneficiaries were 40 years. Majority (77%) and about 92% of the beneficiaries and non-beneficiaries had between 1 to 30 years of farming experience, while about 7% and approximately 51% of maize farmers' cooperative groups' beneficiaries and non-beneficiaries

respectively, do not have some formal education. Salifu *et al.* (2012) found that farm size is largely determined by the amount of resources available to the farmer based organizations (FBO) in terms of land, farm inputs and labour. The study also revealed that of 960 FBO leaders surveyed, 70% of the group leaders were male and 30% female. Although most leadership positions were held by men, fewer than 10% of FBOs restrict membership by agenda. Age data from the survey showed that 87% of the leaders were at least 40years old. The case studies showed that the average age of chairpersons was 57, of secretaries, 51; and of treasurers, 46 years. The most important factors in selecting a chairperson are age, socio-economic status, and the role the person played in the group's formation. According to Ayelech (2011), as an individual stay long, he will have better knowledge and will decide to allocate more size of land, produce more, and supply more. The study conducted by Geoffery *et al.* (2014) found that education level of the household head significantly and positively influenced market participation.

In another study conducted on socio-economic characteristics of maize producing households in the dry savanna of Nigeria, Bamire *et al.* (2010) showed that the age of respondents ranged from 20 to 80 years. The modal age was 50years, and about 80% of the respondents were within the age range of 21 to 60 years. The majority of the youths out-migrated to urban centers for better job opportunities. Chianu and Tsuji (2004) found that the age of an individual as measured in years is believed to be capable of influencing the perception, views, interest and conduct of the person. In a study to assess the socio-economic determinants of cooperative society's access to the services of the Nigerian Agricultural Cooperative and Rural Development Bank, Agbo (2005) found that the mean value for age of cooperative societies with access was lower than those without access. Members of cooperative societies with access spent more years in school than

those members of cooperative without access. In areas of shareholding, asset holding, size of liability, the cooperative societies with access scored higher mean values.

Lagos State Ministry of Agriculture & Cooperatives, Commercial Agriculture Development Project and Work Bank (2013b) report on the Environmental and Social Impact Assessment (ESIA) for the Commercial Agriculture Development Projects at the Ikorodu Fish Farm Estate, Odogunyan, Ikorodu, Lagos showed that the population of fish farmers in the Ikorodu fish farm estate is characterized by a high proportion (75%) of farmers aged 50 years and above; married (73%) with a high proportion of households and individual comprising couples with children (2-4); the adult population who are supposed to be the labour force are less 20%; and proportion of male to female was 55% to 45%. This result shows that a very high proportion of respondents belong to the income level from N100,000 and above (45.5%). Most of the respondents within the group are fish farmers but have other means of income aside farming activities.

Abebaw and Haile (2013) reported that cooperative membership in Ethiopia increases the adoption of improved agricultural technologies, especially mineral fertilizer, and the rate of commercialization. NBS, World Bank and CADP Report (2010) reported that 56.2 percent of the households fall within the household size 5 to 9 members per household. The fairly large household size reflects the age-long African setting of high household size, and cheap labour supply. The report further shows that, 2 – 4 persons per household ranked second with an average of 24.7 percent in the five states with a concentration in Lagos state with 32.0 percent and Cross River state with 29.4 percent respectively. This means that out of the five states, Lagos state has most of the household size 2 – 4 persons. Out of the five states, Kano state is spotted as having the highest of the household size 10 persons and above with 34.7 percent, above the

overall average of 14.6 percent. The CIG members have the highest overall average in secondary education of 43.4 percent with Cross River, Enugu and Lagos states with 50.9, 46.5, and 47.5 percent above the overall average of 43.4 percent respectively, being the highest level of education attained followed by primary education with 34.1 percent. The report further revealed that in Kaduna and Kano states, primary education is the highest level of education among the CIG members with 42.2 percent and 37.6 percent respectively. Education will enhance better application and use of improved technology among the CIG household members. While for Non CIG members, secondary education still dominate with an overall average of 52.1 percent being the highest level of education obtained. Cross River state dominates with 83.3 percent followed by Kano and Enugu states with 50.0 percent and 44.5 percent respectively.

Lagos State Ministry of Agriculture & Cooperatives, Commercial Agriculture Development Project and Work Bank (2013c) report on the Environmental and Social Impact Assessment (ESIA) for the Commercial Agriculture Development Projects at the Araga Farm Settlement, Poka, Epe, Lagos State stated that the population of farmers in Araga Farm Settlement and its surroundings is characterized by high proportion of young farmers (trainees) within the settlement, comprising people of 18 to 45 years, high proportion of single households, high proportion of households and individuals comprising couples with children (2-4); the community of the study area is characterized by low income group including trained farmers; and the relatively low level of income.

World Bank and Kano State Commercial Agricultural Development Project (2016) survey determined demographic, educational as well as economic variables of relevance to the affected persons and which can serve as baseline information for the planning, implementation and

monitoring of the Resettlement Action Plan (RAP). According to analysis made on the heads of households, most of the PAPs are males, constituting 97%, while the remaining 2.9%are females. Majority of the PAPs are farmers, with very little number engaging in other forms of occupation as shown in the analysis on occupation of PAPs. From the survey findings, majority of the Project Affected Persons (PAPs) are between ages 41 to 50, then followed by almost similar frequency for those within age range of 31 to 40 and 51 to 60 years. It is important to note that the age distribution clearly shows that the most active and productive part of the population appears to be affected most. Majority of the PAPs interviewed are married who constitute 95%. About 3.4 % are unmarried and 1.4% are widows. Considering the fact that the proposed project area is predominantly an agrarian community in the rural setting, there is less consideration to western education despite government efforts at providing schools and services. From the survey findings on education level of the PAPs, about 77.5% have no formal education, 14.6% attended primary school, while 6.3% went to secondary schools and only 1.4% had tertiary education. The literacy level is generally low, with only 14.6% having at least primary education. The income distribution of the affected persons shows that majority of them (65%) earn incomes in excess of N10,000 per month. This is followed by 18% with maximum income of up toN40,000. Very few of the respondents earn more than N50, 000 per month. The socioeconomic data shows that many of the affected persons are members of large families. About 56.7% belong to families with a size ranging between 7 and above members, 24.7% are families with a size range of 5 to 7 members. The family size of 2 – 4 persons is the lowest.

2.3.2 Socioeconomic Factors Influencing Production, Processing and Marketing in Nigeria

According to Muhammed (2011), aged households are believed to be wise in resource use, and it is expected to have a positive effect on marketable surplus. Age is a continuous variable measured in years. According to Ayelech (2011), as an individual stays long, he will have better knowledge and will decide to allocate more size of land, produce more and supply more. On the other hand, young household heads have long investment horizon and it was expected to have either positive or negative effect on market participation. According to Gebre (2015), age of household head had been positively associated and statistically significant at 1% level of significance. Consistence to this study, Christopher *et al*. (2014) found that farmer's age had a positive and significant impact on the decision to participate in the potato market. Similar to this finding, results by Randela *et al*. (2008) found that age of respondent having positive and significant relationship with household head commercialization. In contrast, Adugna (2009) in a study on vegetable market supply reported that age of the household head had negative effect on the elasticity of onion supply to the market. According to Berhanu *et al*. (2011) age of household is negatively related with the level of market participation. Ayelech (2011) reported that male households have been observed to have a better tendency than female household in fruit production and supply of fruit due to obstacles such as lack of capital, access to credit and extension services encountered by female households.

Similarly, Ayelech (2011) reported that households with better experience in avocado and mango farming produced more amounts of avocado and mango than the ones with less experience and, as a result, they are expected to supply more amounts of avocado and mango to the market. If a

farmer is experienced in potato cultivation, he can develop market participation through experience. So, experience is expected to affect both participation and level of participation of households in potato market positively. According to Randela et al (2008), the level of education gives an indication of the household ability to process information and causes some farmers to have better understanding and interpretation of information than others. According to Abraham (2013), education broadens farmers' intelligence and enables them to perform the farming activities intelligently, accurately and efficiently. Moreover, better educated farmers tend to be more innovative. Therefore, education is hypothesized to affect positively both market participation and level of participation of the farmer. According to Gebre (2015), education of value chain actors had been associated positively with farmers' likelihood to participate in potato market and statistically significant at 10% level of significance. Inline to this, Christopher *et al*. (2014) indicated that education having positive and significant effect on smallholder farmer's decision to enter the potato market. This can be highly attributed to the fact that education empowers a farmer to make informed decisions and identify market opportunities where they exist. The study conducted by Geoffery *et al*. (2014) found that education level of the household head significantly and positively influenced market participation. They further explained that as an individual acquire more education he/she is empowered with the marketing skill and knowledge that will spur the individual to participate in the market. This is also in line with the findings by Astewel (2010) who illustrated that if puddy producer gets educated, the amount of puddy supplied to the market increases, and this suggests that higher level of education provides a greater opportunity for the farmers to participate in the pineapple market. Moti *et al*. (2009) also found that household crop market participation was determined by literacy of the household head.

Abraham (2013) reported that the closer the market, the lesser would be the transportation charges, reduced walking time, and reduced other marketing costs, better access to market information and facilities. The results of Christopher *et al*. (2014) revealed that distance to the nearest town had a positive and significant effect on potato farmer's decision to participate in the market. This is because the nearer the farmer is to town the easier it is to access buyers who offer better payment terms than in the case of farmers far away from towns. Therefore, it is hypothesized to affect both participation and level of participation positively. Christopher *et al*. (2014) argued that the state of bad roads negatively impacted on farmers' access to urban markets, hence hindrance to smallholder commercialization and increased incomes. Similarly, it was hypothesized to affect both participation and level of participation positively.

According to Kindie (2007), extension service had positive effect from his study for market participation through its stimulation of production and productivity. Since, farmers that have frequent contact with Development Agents will have better access to information and could adopt better technology that would increase their marketable supply of sesame. Credit Access is a dummy variable taking the value 1 if the farmer used loan and zero otherwise. Abraham (2013) opined that access to credit would enhance the financial capacity of the farmer to purchase inputs, thereby increasing vegetable production and market share size; hence access to credit would have positive influence on level of production and sales. Muhammed (2011) also found that if pepper and *teff* producer gets credit, the amount of pepper and *teff* supplied to the market increased. Therefore, it was hypothesized to affect both participation and level of participation positively. The gender of the head of the household has a significant impact in the market participation decision. Male headed household are expected to have a positive impact on market participation because they are more resource endowed than their female counterpart. Jagwe *et al*.

(2010) found that, female actors are more negatively affected by the transaction costs of searching for buyers, contracting and enforcing a sale transaction as opposed to the male actors. On the other hand, price factor positively influences market participation. Alene *et al*. (2008) argued that output price is an incentive for sellers to supply more in the market.

2.3.3 Gender Involvement and Participation in Agricultural Value chain

According to World Bank and IFAD (2008), there is a growing trend of more women being involved in agriculture as men seek alternative income generating activities in non-farm activities. Nevertheless, due to patriarchal nature of most rural societies, women generally do not have the same rights to productive resources as men. While women involvement in agricultural production contributes to increased production and export of high value crop as reported by Lastarria (2006), women do not equally benefit as men. Despite the important role played by women in the rural economy and in food production, their access to resources, services and opportunities is much lower than that of men (World Bank, 2018). Gender norms, discriminatory beliefs and traditional household roles are major causes of this discrepancy. These limit their access to resources (FAO, 2011) and their mobility, which constrains their access to a broader range of markets, and pose obstacles to their participation in institutional arrangements such as inter-village marketing or social groups (Perez et al., 2014). All of these factors also disincentivize women from participating in value chains, or restrict their opportunities within them, meaning that women often miss out on the benefits associated with adding value (World Bank, 2015; International Finance Corporation, 2016). According to the reports of KIT, Agri-ProFocus & IIRR, (2012), the role of women in agricultural value chains which are usually under-recognized has started to become more and more obvious.

Although the importance of revitalizing the agricultural sector in Africa has been recognized through various commitments made by governments and donors, the Food and Agriculture Organization (FAO) suggests that quicker and better results in agriculture will be achieved if the productive potential of women is maximized. The World Bank has established that reducing the gender gap in agricultural productivity lifts populations out of poverty, for example 238,000, 80,000, and 119,000 people in Malawi, Tanzania and Uganda respectively in a given year (World Bank, 2015). According to further estimates, if women and men had similar access to productive resources along value chains, it would be possible to increase total agricultural output in developing countries, which in turn, would reduce the number of hungry people in the world by about 12- 17% (FAO, 2011, World Bank, 2015, United Nations Development Programme, 2016).

Other scholars including Coles and Mitchell (2011) have argued that the transformation in gender roles acquired at value chain level does not always translate into the household level. According to KIT *et al.* (2012) the resistance for change in gender roles is rooted in power relations, and the fear that by giving some women more power, others (especially men) will lose out. However, it has also been reported that value chain intervention resulted into changes in gender roles and relations. Such changes are a necessary step towards women empowerment. The authors reported from evidence collected from seven case studies where changes in gender roles between men and women have been acquired. These value chain from which evidence were collected are from diverse background ranging from shea butter making, livestock, dairying and green agriculture from different countries in Africa, Asia, and South America.

KIT, Agri-Pro Focus & IIRR, (2012) reported that in agricultural value chains, women make up a large part of the work force. Women rights and benefits they derive from their participation in the value chain are frequently violated, and their contribution to the economy is largely invisible. In the context of value chain development, excluding women, results in underutilization of their labour force which may decrease agricultural productivity. Lastarria (2006) asserted that while women involvement in agricultural production has increased; their participation in value chain development activities is concentrated in lower levels of the value chain especially in production. United States Agency for International Development (USAID, 2009) observed that women in developing countries are widely recognized as the face of farming, especially among smallholders. The growing trend of women's engagement in agriculture, commonly referred to as feminization of agriculture, has resulted in changes in gender roles.

Changes in gender relations is an important factor in determining the division of labour between what is considered productive and reproductive; this is argued to be the basis for the distribution and allocation of work, income, wealth and assets, and productive inputs as reported by Lastarria (2006). Within the agricultural sector, traditions and conventions often dictate which roles go to which gender, and traditionally female tasks and crops are generally lower wage and less profitable than those assigned to men. Activities such as ploughing and spraying are regarded as manly in some communities and rely entirely on male labour (World Bank, 2015). Extension services are also less accessible to women, as they may fail to consider women's long working hours on the farms and at their homes, which are likely to make their participation more challenging, especially when it involves travelling outside their homes and villages (FAO, 2011). As a consequence, women's output continues to lag behind due to unequal access to services and training (Lemma et al., 2016).

In value chains, gender roles and expectations lead to the concentration of women in lower rungs, where they receive correspondingly lower earnings. Generally, men tend to be concentrated in higher remunerated contract farming segments of value chains by virtue of controlling the household land and labour division (FAO, 2016, IFC 2016). United States Agency for International Development (USAID, 2009) opined that new research focusing on agricultural credit, land tenure security, managing risk, access to assets, and the agricultural policy environment aim to discover how gender roles and relations affect these issues. Research on gender and agriculture in Tanzania by Leavens and Anderson (2011) also indicates that traditional gender roles in agriculture are changing, although causes for such changes are different and location specific thus difficult to generalize.

2.3.4 Implementation Plan and Status of CADP in Nigeria

According to World Bank (2016) the Regional Vice President extension of the project closing date to May 31, 2017 was granted on November 18, 2016. Also, partial cancellation of US$3 million requested by the client has been effected. All the 9 PDO-related KPIs (increase in production, yields and volume of sales among project beneficiaries) have met and surpassed even with the challenging environment in some States. The project has made significant progress in the implementation of the Women and Youth Empowerment Program. Some of the beneficiaries that have received their grants have started their enterprises and the training of Batches 2 and 3 have been concluded across the States with the exception of Kaduna State. Further, the implementation of the business alliance is going on well and helping participants have access to assured output market, technology and in some cases, access to finance. The project has also started the process of procuring consultancies services for the end of project studies, including

but not limited to impact study, beneficiary assessment and Borrower's completion report. Following the decision of the government to use the CADP implementation structures for the redesigned Staple Crop Processing Zone project (SCPZ), CADP has been driving the preparation of the revised SCPZ. The revised SCPZ project would facilitate the continuation of project activities and sustain gains recorded under CADP. Engagement with the State governments on the new project should include discussion on the removal of multiple layers of approval to speed up project implementation.

According to World Bank and Kano State Commercial Agricultural Development Project (2016) the purpose of resettlement measures is to mitigate sub project's negative impacts on PAPs. Resettlement measures are geared toward mitigating direct social and economic impacts that may result because of the road expansion and construction works in Lots 1, 2, 3, and 4. The measures are aimed at providing compensation and livelihoods restoration packages that are needed for restoring PAPs livelihoods to the level or better prior to the sub project intervention. It is important to take note of the fact that people will not be relocated to another location as a result of the road expansion and construction activities in Lots 1, 2, 3, and 4. Majority of assets to be affected are farmlands (fractured portion), with few number of properties in built-up areas which require no displacement. Basically there is no complete takeover of assets like farmland, shops or house. In order to determine the magnitude and the likely impacts of the road expansion and construction works on assets and people, site specific screening exercises have been undertaken in Lots 1, 2, 3, and 4. The screening exercises provided the RAP preparation team with inventory of assets and with the actual number of PAPs who are likely to be affected by the road expansion and construction works. On the basis of the inventory of assets and affected persons, it is

anticipated that the road expansion and construction works will affect two categories of assets: i) immovable structures and, ii) businesses.

As provided in the RPF, compensation of the project affected persons is either in-kind, cash or in form of assistance. Under this sub project, compensation payment will be in cash and assistance. Eight cash payments are due to those who have their properties or assets are permanently or partially affected by the project (permanent and partial damage to properties, farmlands, plots, crops, and utilities.) Assistance will also be given to those whose commercial selling points are affected partially by the proposed sub project. According to World Bank and Kano State Commercial Agricultural Development Project Report (2016), the Resettlement Action Plan (RAP) was prepared due to the farm access road construction project of Kano State CADP at Kauran Mataand surrounding communities of Madobi Local Government, Kano State. The main aim of the RAP is to provide policy and procedures for land acquisition, compensation and resettlement of Project Affected Persons (PAPs) and replacement of their losses due to the construction of the Farm Access Road. The project acquired a total of 12,919.32 m^2 of farm land, 11 number private plots, 34 Buildings, 4 cornstalk shades, 2 CIS (Construction Industry Scheme) shades, and 940 trees along the proposed carriage width and shoulders; and the same square meters of agricultural land worth of planted / standing crops will permanently be taken for the construction purposes.

2.3.5 Volume of Grant Approved and Accessed by Different Value Chains (Naira)

Available records from World Bank (2016) showed that the sum of ₦26,101,951.00, ₦35,508,079.00 and ₦40,220,188.80 were granted to fruit tree value chain in the Years 2010, 2011 and 2012, respectively. At the end of Year 2010, 2011 and 2012 the sum of ₦9,000,000.00,

₦14,660,291.30 and ₦13,334,776.70 were accessed from the World Bank by fruit tree value chain. This represented 34.5%, 41.3% and 33.2%, respectively. The sum of ₦136,310,188.70, ₦185,431,079.20 and ₦210,038,763.90 were granted to maize value chain in the year 2010, 2011 and 2012, respectively. At the end of year 2010, 2011 and 2012, respectively the sum of ₦58,750,000.00, ₦81,446,062.70 and ₦80,973,450.20 were accessed from the World Bank by maize value chain. This represented 43.1%, 43.9% and 38.6% access index, respectively. The sum of ₦127,609,538.30, ₦173,595,052.80 and ₦196,632,034.30 were granted to poultry value chain in the year 2010, 2011 and 2012, respectively. At the end of year 2010, 2011 and 2012 the sum of ₦53,900,000.00, ₦73,502,472.20 and ₦75,501,712.30 were accessed from the World Bank by poultry value chain respectively. This represents 42.2%, 42.5% and 38.4% access index, respectively. Generally, amount accessed by different enterprises/value chains was very low and less than 50%. The access index for the entire value chains (fruit trees, maize and poultry) exhibits the same trend with increase in 2011 and a sharp decrease in 2012. This apparently could not be explained by any known factor in view of the popularity of the sub-sectors especially poultry sub-sector.

2.3.6 Performance of the targeted value chain relative to baseline in Nigeria

Ani (2013) assessed the commercial agriculture development project in Enugu State, Nigeria. Results showed that all (100.0%) the CIGs registered their groups. About 74% of the CIGs registered with Cooperate Affairs Commission (CAC) while 25.9% registered with the State Ministry of Human Development and Poverty Reduction (MHDPR). This implies that they met the requirements of CADP that required them to register under any of the agencies before they can participate or benefit from the project. Majority of the groups may have registered under

CAC because the agency seems to be older than MHDPR and majority of members of this group had already registered with the agency prior to the inception of CADP. However, CADP has memorandum of understanding with MHDPR. The groups were properly guided by CADP desk officer (facilitator credit) on the modalities for registration. They also issued registration forms collected from MHDPR to interested group. This is possible because CADP has an existing relationship via a memorandum of understanding entered into with the MHDPR on registration of identified formed CIGs. The author found that some (43.2%) of the CIG groups were involved in maize/land development, while 40.7% and 16.0% were involved in poultry and fruit trees, respectively. The reason why a greater proportion was involved in maize and poultry could be as a result of the project life cycle. These two commodity value chains have short gestation periods of between 6 months and 1 year and are likely to provide returns earlier than fruits trees which take a longer period. Majority (93.8%) of the CIGs had received CADP grants/support. The remaining (6.2%) had not received because they probably could not meet up with the CADP requirements. This finding of Ajibo (2013) also reported that only 13% of farmers in Enugu state had access to credit. A performance index model was used in assessing the performance of the CADP as regards the number of CIGs and SPs registered. Results showed that CADP proposed to establish 100, 200, and 630 CIGs in the year 2010, 2011 and 2012, respectively. The author found that 37, 123 and 497 CIGs were formed by the end of each year respectively. The performance index scores were 37%, 62% and 78%, respectively. This implies that CADP's performance as regards CIG's formation/registration was low in 2010 but high in 2011 and 2012. The formation/registration of CIGs has also improved progressively over the years. This could be as a result of increased awareness of the programme.

World Bank (2016) reported that the revised baseline calculation based on the net sales figures of the beneficiaries participating in the project and categorized by 3 batches of net sales of rice by batches in (Naira/mt) as follows: Cross Rivers State Batch 1 was 420mt, Batch 2 was 1850mt, Batch 3 was 270mt; Kano Batch 1 was 18.9mt Batch 2 was 404.55mt; Lagos Batch 1 was 155.56mt, Batch 2 was 451.96mt. The total was 3,370.99mt. Lagos batch 3 was 259mt and Kano batch 3 was 600mt. Therefore, revised baseline derived from the summation of the 3 batches of the net sales of the CIGs was 3,370.99mt (₦369,953,400). The report suggested that the 73.46% increase in sales from a baseline value of 3,370.99mt sold for ₦369,953,400 is specifically relative to the beneficiaries for this value chain categorized in 3 batches for Cross Rivers State and 2 batches for Kano and Lagos State. For maize value chain, the revised baseline calculation based on the net sales figures of the beneficiaries participating in the project and categorized by 3batches of production of maize by batches in (Naira/mt) as follows: Enugu Batch 1 was 200mt, Batch 2 was 120mt, Batch 3 was 259. The total was 579mt. Kaduna Batch 1 was 335mt, Batch 2 was 510mt, Batch 3 was 1205.85mt. The total was 2050.85mt. Kano Batch 1 was 600mt, Batch 2 was 806mt, and the total was 1406 mt. This then gives a grand total of 4025.85mt. Therefore, revised baseline derived from the summation of the 3 batches of the net sales of the CIGs is 8,629.45mt (₦362,619,180). The report further specified that the 44% increase from a baseline value of 14,9758,629.45mt (₦362,619,180) was specifically relative to the beneficiaries for this value chain categorized in 3 batches for Enugu and Kaduna States and 2 batches in Kano State. The 34% increase from the baseline value of 5,498,492mt creates ₦2,978,533,500 was specifically relative to the 64CIGs (398members) of beneficiaries for this value chain categorized in 3 batches

According to Ani (2013), the total volume of IDA fund initially proposed by the World Bank as grant to farmers to complement their counterpart contribution in the year 2010, 2011 and 2012 were ₦783,842,373.00, ₦641,519,042.30 and ₦571,077,731.90, respectively. At the end of each year, CADP applied for ₦328,885,695.70, ₦333,083,623.20 and ₦282,861,167.00, respectively. The index scores were 42%, 51.9% and 49.5% respectively. This was less than 50% except for the year 2011. This poor performance could be traced to the inability of the project to register more CIGs and the difficulty of the CIGs providing counterpart funds. Results showed that the sum of ₦290,021,678.00, ₦394,534,211.00 and ₦446,890,987.00 were granted to CADP by World Bank as IDA grants to farmers in the Year 2010, 2011 and 2012, respectively. At the end of 2010, 2011 and 2012, respectively the sum of ₦117,312,125.00, ₦171,685,990.00 and ₦210,286,349.00 were accessed from the World Bank by CADP. This represented 40.5%, 43.5% and 47.1% respectively. This further shows that there's a huge difference between grant approval and grant accessed. Funds may be approved but may be difficult to access for that which it is meant for. The reason for this could be that some of the projects were abandoned by the CIGs due to lack of counterpart fund from the beneficiary, hence the IDA's contribution could not be released. Another reason could be as a result of the bureaucratic nature of fund approval and release which involve processes from SCADO to NCO to the World Bank.

Bako (2016) assessed the impact of commercial agriculture development project on dairy production and rural livelihood in selected Local Government Areas of Kaduna state, Nigeria. The impact result revealed a positive and significant impact of CADP on the assets, productivity and income of the respondents. Specifically, the findings suggested that the beneficiaries experienced a positive increase in their assets, productivity and income by ₦48,636.83,0.12litre/cow/day and ₦18,202 per annum respectively. The Wilcoxon-signed-rank

test value of 6.47,5.89 and 7.64 revealed that CADP has significant positive impact on assets, productivity and income at 1% level of probability respectively.

Kolade (2015) reported that the level of awareness of CADP among the beneficiaries was highest for seed treatment by (26%) and lowest for pest and diseases control by 16%. On the other hand, it was also found that the most adopted recommended practices of CADP by the beneficiaries was ridging, fertilizer application and storage, which was indicated by (23%) of the beneficiaries. The most adopted recommended practices of CADP by the non-beneficiaries was storage, which was indicated by (16%) of the non-beneficiaries. The results from the multiple regression analysis revealed that age; farm size, education, amount of credit received, household size and extension contact were the factors influencing the adoption of maize recommended production practices at 1% and 10% levels of significance. The results from chow test analysis revealed that commercial agriculture development project had significant impact on beneficiaries 'output, income, yield and level of living at 5% levels of significance. High cost of farm inputs was ranked 1st by 32% of maize farmers' cooperative groups' beneficiaries and 2nd by about 25% of non-beneficiaries as the foremost constraints in the implementation of the maize recommended production practices in the study areas.

National Bureau of Statistics, World Bank and CADP (2010) reported that fruit trees is noted to be the commodity with the highest harvested output among the value chain commodities, followed by rice, oil-palm, maize and cocoa in that order. Across the states, the leading crops with highest value chain are as follows: Cross-River (oil-palm), Enugu (rice), Kaduna (fruit trees), Kano (rice) and Lagos (rice). On the overall, income level of non-members is higher than those of CIG member households. Similarly, non-members recorded higher sales (income) in

two of the five states (Cross-River and Kaduna), but the CIG member households have higher income in such states as Enugu, Kano and Lagos states. The report further showed that yield was highest for fruit trees among the target commodities for the CIGs. This was followed by oil-palm and rice in that order. The same trend was noted across the states where the project was being implemented. Of all the five targeted value chain commodities, farmers producing rice recorded the highest sales across the state. This was followed by fruit trees, oil-palm, maize and cocoa respectively. Rice sales were also highest in Enugu and Lagos, Oil-palm in Cross-River and Fruit trees in Kaduna and Kano States. This showed that the market share for rice is fairly large. The project could strategically promote rice technologies in states with comparative advantage. By doing this, the project can contribute to achieving the Agricultural Transformation Agenda (ATA) goal on self-sufficiency in rice production. On the average, households spend more time in accessing the market, and less for irrigation water source and processing centre. However, travel time to market is highest in Cross Rivers state and lowest in Kano State. This is not surprising given that Kano is known as one of the commercial hubs for the country. Similarly, households in Kano are closer to irrigation water source, spend less on transport to market and irrigation water source. This may be connected to the level of investments in road and irrigation infrastructure in the north.

In a United State Agency for International Development (USAID) micro report № 171(2011) for ACDI/VOCA, Creevery et al*., (2010)* documented that in Pakistan, BTV projects successfully facilitated the development of a more open and receptive environment for development of the value chain (VC). There was also an increase in trust among VC actors. There was also the opportunity to promote festivals and competitions and gave small growers the opportunity to understand and incrementally adopt needed upgrades in production and changes in marketing

behavior. Producers who had access to the projects input agent network increased their earnings from maize, bean and groundnut sales by 173% on average between 2006 and 2009, compared to an increase of just 47% for non-participating producers. In an Asian Development Bank Publication in 2013, titled Commercial Agriculture Development, the following impacts were recorded after the implementation of the projects: i. Reduced poverty in the rural communities of 11 districts in the Eastern Development Region (EDR) of Nepal through equitable sustainable commercialization of agriculture; ii. increased economic activities and jobs in the project area. Social inclusion activities promoted the participation of all stakeholders including the poor, disadvantaged, and women in commercial agriculture; iii. the project directly generated employment opportunities for subsistence stakeholders by promoting high value crops production and marketing; iv. the landless poor through skill-based training, made more employable and capable of income generation. v. commercial stakeholders were assisted to add value to agricultural products and encouraged to adopt socially inclusive behavior to help the less advantaged.

Cattaneo (2013) stressed that, actions aimed at developing value chains have contributed to improve their export market intelligence, and boost their exports at the margin, with new markets and new products. They have also helped improve their productive capacity, in particular with regard to compliance with standards and competitiveness. The following impacts of activities were also recorded: better skilled workers, new jobs, poverty alleviation, improved environmental performance, higher exports, better working conditions, better infrastructure, cost savings for company, improved health among workers or local community and cost savings for consumers. Riisgaard et al., (2010) in the publication: Evaluation study, Gender and value chain development documented that an internal impact assessment conducted of a UNIDO/CIDA

funded programme aimed at linking low-income, isolated Pakistani women embroiders to markets. The assessment reveals that apart from increased business skills, product quality and income, women also report increased contributions to household decision-making, self-confidence and mobility. Oehmke *et al.,* (2012) in a USAID sponsored publication titled, "impact of USAID-supported agricultural programmes", noted that after implementation of development programmes aimed at ending hunger in Africa, the following impacts were observed: i. Increases in small-holder incomes in Ethiopia, Ghana, and Rwanda; ii. Qualitative improvement of livelihood and reduced poverty in Ghana, Rwanda and Ethiopia; iii. Reduction in the number of months spent with insufficient food in Ethiopia. Morris *et al.* (2010) in a publication, Adoption and impacts of improved maize production technology pointed out that, Strengthened institutional capacity by the Ghana Grains Development Project (GGDP) strengthened the capacity of the CRI and other Ghanaian institutions to carry out effective research; Better trained human capital during the life of the GGDP, thousands of Ghanaian researchers and extension officers received training and Improved information the GGDP generated a substantial amount of information that can and is being put to good use by many different users.

2.3.7 Factors Constraining the Implementation of Commercial Agriculture Development Project (CADP)

Ani (2013) who assessed the CADP in Enugu State, Nigeria reported that the major constraining factors to effective implementation of CADP business plan from the beneficiaries point of view were inadequate monitoring and evaluation of the project by the implementers, delays in approving funds by national and state CADP offices, lack of provision of state government

counterpart contribution, lack of competent and credible service providers, illiteracy in keeping records and developing good business plans and the problem of groups not financially buoyant to finance their counterpart contributions. Okello (2012), in a study identified the following production level constraints and difficulties being linked to markets:

i. Declining land-labour ratio leading to decline in land- to-person ratio, disparities in the distribution of landlessness among small holder farmers;
ii. Stagnant food productivity due to low input use-limited fertilizer application, limited irrigation, lack of green revolution;
iii. Poor infrastructure and poor support services;
iv. Poorly functioning and failed markets for credit, information, technical advice and insurance;
v. Output markets fail for smallholder farmers because they are widely scattered making produce assembly too costly, they are poorly organized and tend to trade in relatively small volumes.

Roberta et al, (2012), pointed out that the cost of inputs is a major concern to maize farmers, as is the timely availability of inputs with other socio-economic constraints identified as follows:

i. Lack of access to formal credit sources (government institution, cooperatives etc.);
ii. Insufficient access to fair market price information;
iii. Inefficient marketing system for farm inputs and products, and;
iv. Poor infrastructure (roads, irrigation, poor harvest facilities, etc.)

In a publication of International Institute of Tropical Agriculture (IITA), Tahiro et al. (2009), in astudy conducted to assess the constraints affecting production deployment of maize seed in A Drought Tolerant Maize for African (DTMA) countries of West Africa found that the factors limiting maize seed production and deployment in selected countries in West Africa especially at the regional level that seed production and poor seed policies constitute the major constraints of seed sector. Lack of financial and human resources, inadequate and unavailability of a sufficient quantity of foundation seeds constitute the problems in seed production and processing infrastructure. Major factors that constrain the establishment of Seed Company include lack of access to production credit, high initial investment costs, and lack of access to seed production processing infrastructure. Farmers' perception of yield, seed price, and prices of other inputs, weather conditions, and the effectiveness of promotional campaigns affect the demand for maize seeds. Policy-related impediments include unfavorable seed policies such as taxation, import and export restrictions, and a lengthy variety released process, and controlled seed markets (Abebe, 2010)

Ofana et al., (2016) reported that the smallholder farmers are constrained by many problems including those of poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land and environmental degradation, inadequate research and extension services, etc. According to Asante et al., (2016), high variability in market prices of farm products and farm inputs cause significant risks to household income. Lack of efficient marketing institutions and rural infrastructure and access to credit prohibits smallholder farmers from assuming such risks. These factors influence commercialization by affecting conditions of commodity demand and supply, input and output prices, and the transaction costs faced by farmers, traders, and other members in the food marketing channels.

2.4 Analytical literature

2.4.1 Duncan Dissimilarity Index

The **index of dissimilarity** is a demographic measure of the evenness with which two groups are distributed across component geographic areas that make up a larger area. The index score can also be interpreted as the percentage of one of the two groups included in the calculation that would have to move to different geographic areas in order to produce a distribution that matches that of the larger area. The index of dissimilarity can be used as a measure of segregation. Duncan Index explores different measures of segmentation and involvement by gender in different nodes of the value chain. The model is stated as (USAID, 2009):

$$D_j = 100\left[\frac{1}{2}\right]\sum_{i=1}^{N}\left|\frac{f_j}{F} - \frac{m_j}{M}\right| \qquad \text{Eqn 2.1}$$

Where,

D_j = Duncan dissimilarity index for gender involvement in the jth stage (percent)

f_j = number of female beneficiaries involved in the j^{th} stage.

F = Total number of female in the population

m_j = number of male beneficiaries involved in the jth stage.

M = Total number of male in the population

N = Number of stages.

The index of dissimilarity is applicable to any categorical variable (whether demographic or not) and because of its simple properties is useful for input into multidimensional scaling and clustering programmes. It has been used extensively in the study of social mobility to compare distributions of origin (or destination) occupational categories. Duncan Dissimilarity Index (DDI) ranges from 0 to 100. An index of 0 indicates that involvement in the jth stage is not gender-segregated, and that female and male actors are distributed across these stages in proportion to their total engagement in the value chain. An index of 100 indicates that participation by male and female actors are entirely different in these stages along the maize value chain (USAID, 2009). An index of 0.75 or 75% means that 75% of the respondents need to move to obtain equal distribution of employment or involvement or engagement. In gender studies, this means that 75% of women would have to change jobs for the employment distribution to be the same and if its negative, it means 75% of the men need to change jobs to be at parity with the women.

2.4.2 Multivariate Probit Model (MPM)

The multivariate probit model can be seen as an extension of the probit model, since it allows estimating several probit models simultaneously, while allowing the error terms in those models to be correlated (Greene, 2003). Ignoring the correlation across error terms would lead to inefficient coefficient estimates and thereby erroneous inference (Hsiao, 2003). Correlation occurs when unobservable characteristics (e.g., intrinsic management skills) captured in the error terms influence the adoption decision of intensification strategies. Significantly positive correlations in the error terms have been interpreted as evidence of complementarity between strategies, whereas significantly negative correlations have been interpreted as evidence of substitutability (Asfaw *et al.,* 2016; Ndiritu *et al.,* 2014). Multivariate probit models allow error

terms (unobserved/unknown factors) to be freely correlated across different practices (Kassie et al.2013). The M- equation multivariate probit model is structured as follows.

$$y^*_{im} = \beta_m {}' X_{im} + \epsilon_{im}, = 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 2.2$$

$$y^*_{im} = 1 \; if y^*_{im} > 0 \; and \; 0 \; otherwise \ldots\ldots\ldots\ldots\ldots\ldots 2.3$$

$\epsilon_{im}, m=1,\ldots,M$ are error terms distributed as multivariate normal, each with a mean of zero, and variance-covariance matrix V, where V has value of 1 on the leading diagonal and correlations $\rho jk = \rho kj$ as off diagonal elements. Positive correlation indicates synergies between practices. Negative correlation indicates the existence of tradeoffs (Kassie *et al*. 2009). The multivariate probit model has a structure like the Seemingly Unrelated Regression (SUR), except that the dependent variables are binary indicators. The y_{im} might represent outcomes for M different choices at the same point in time, for example, whether a farmer adopts M technologies. The Xim is a vector of explanatory variables and βm are unknown parameters to be estimated. The probability function of the probit model is usually the standard normal density which provides predicted values within the range (0, 1).

The empirical specification of choice decision of information sources can be modelled in two ways, by either multinomial or multivariate regression analysis. One of the underlying assumptions of multinomial models is the independence of irrelevant alternatives that is error terms of the choice equations are mutually exclusive (Greene, 2003). However, when choices are not mutually exclusive as farmers may have more than one choice at the same time, the random error components of the choices may be correlated. Therefore, we consider using a multivariate model which allows for the possible contemporaneous correlation in the choice to access

different sources simultaneously. The multivariate probit model is estimated by simulated maximum likelihood. The multivariate probit model is based on the multivariate normal distribution and is recommended in cases of independence among the irrelevant alternatives (Greene, 2003). We note that, in the past, multivariate probit models have been used in transportation research in a number of cases (Choo & Mokhtarian, 2008). The general specification for a multivariate probit model of dependent variables (or alternatives) can be expressed as shown in equation (2.2). In the case of fund availability, the individual models in a system can be stated as (Jenkins *et al.,* 2011):

$$\left.\begin{aligned} Y_{i1} &= X'_{iJ1}\beta_1 + e_{i1} \\ Y_{i2} &= X'_{iJ2}\beta_2 + e_{i2} \\ Y_{i3} &= X'_{iJ3}\beta_3 + e_{i3} \\ Y_{i4} &= X'_{iJ4}\beta_4 + e_{i4} \end{aligned}\right\} \qquad Eqn\ 2.3$$

Where,

Y_{im}= Outcomes for *M* different choices at the same point in time

X′i = Vector of institutional factors affecting the availability of matching grant

βj = Vector of unknown parameters (j = 1, 2, 3, 4), and

ε_{im} = Unobserved error term.

The probability that all four reasons will be preferred is given as:

$$\Pr(Y_{i1} = 1, Y_{i2} = 2, Y_{i3} = 1,\ \ Y_{i4} = 1) = \Pr(e_{i1} \leq \beta X_{i1}, e_{i2} \leq \beta X_{i2}, e_{i3} \leq \beta X_{i3}, e_{i4} \leq \beta X_{i4})$$

Multivariate probit estimation has already been used in a number of studies, namely, Gillespie, Davis, and Rahelizatovo (2004); Jenkins *et al.* (2011), Mittal and Mehar (2015), etc. They argue that multivariate probit framework allows for increased efficiency in estimation in the case of simultaneity.

2.4.3 Principal Component Analysis (PCA)

Principal Component Analysis (PCA)is a dimension-reduction tool that can be used to reduce a large set of variables to a small set that still contains most of the information in the large set.

Principal component analysis (PCA) is a mathematical procedure that transforms a number of (possibly) correlated variables into a (smaller) number of uncorrelated variables called principal components.

Principal component analysis is a technique for feature extraction—so it combines our input variables in a specific way, then we can drop the "least important" variables while still retaining the most valuable parts of all of the variables! As an added benefit, each of the "new" variables after PCA are all independent of one another. This is a benefit because the assumptions of a linear model require our independent variables to be independent of one another. The PCA will identify the important constraints. The model is stated as:

$$\mathbf{Y_1 = a_{11}X_1 + a_{l22}X_2 + \ldots + a_{1n}X_n} \quad \text{.....} \quad \mathbf{Eqn\ 2.5}$$

$$\mathbf{Y_2 = a_{21}X_1 + a_{l22}X_2 + \ldots + a_{2n}X_n} \quad \text{.....} \quad \mathbf{Eqn\ 2.6}$$

$$\mathbf{Y_3 = a_{31}X_1 + a_{l32}X_2 + \ldots + a_{3n}X_n} \quad \text{.....} \quad \mathbf{Eqn\ 2.7}$$

$$Y_n = a_{n1}X_1 + a_{n2}X_2 + \ldots + a_{nn}X_n \quad \text{.....} \quad \textbf{Eqn 2.8}$$

Where,

$Y_1, Y_2, \ldots, Y_n$ = observed constraints among the value chain actors.

$a_1 - a_n$ = factor loading or correlation coefficients.

$X_1, X_2, \ldots, Xn$ = unobserved factors constraining the value chain actors.

2.4.4 Multivariate Regression Technique

Multivariate statistical methods are powerful tools for analysis and manipulation of large data sets. As the name implies, multivariate regression is a technique that estimates a single regression model with more than one outcome variable. When there is more than one predictor variable in a multivariate regression model, the model is a multivariate multiple regression. The multiple linear regression model is used to study the relationship between a dependent

variable and one or more independent variables. The generic form of the linear regression model is

$y = f(x1, x2, \ldots, xK) + \varepsilon$ …….. Eqn 2.9

$= c + x1\beta1 + x2\beta2 + \cdots + xK\beta K + \varepsilon,$ ……. Eqn 2.10

Where

y is the dependent or explained variable and

$x1, \ldots, xK$ are the independent or explanatory variables

c = constant term

ε…… error term

One's theory will specify $f(x1, x2, \ldots, xK)$. This function is commonly called the population regression equation of y on $x1, \ldots, xK$. In this setting, y is the regressand and xk, $k=1, \ldots,$ and K are the regressors or covariates. The underlying theory will specify the dependent and independent variables in the model.

It is not always obvious which is appropriately defined as each of these—for example, a demand equation, $quantity = \beta 1 + price \times \beta 2 + income \times \beta 3 + \varepsilon$, and an inverse demand equation, $price = \gamma 1 + quantity \times \gamma 2 + income \times \gamma 3 + u$ are equally valid representations of a market. For modeling purposes, it will often prove useful to think in terms of "autonomous variation." One can conceive of movement of the independent variables outside the relationships defined by the model while movement of the dependent variable is considered in response to some independent or exogenous stimulus.1.

The term ε is a random disturbance, so named because it "disturbs" an otherwise stable relationship. The disturbance arises for several reasons, primarily because we cannot hope to capture every influence on an economic variable in a model, no matter how elaborate. The net effect, which can be positive or negative, of these omitted factors is captured in the disturbance. There are many other contributors to the disturbance in an empirical model. Probably the most significant is errors of measurement. It is easy to theorize about the relationships among precisely defined variables; it is quite another to obtain accurate measures of these variables. For

example, the difficulty of obtaining reasonable measures of profits, interest rates, capital stocks, or, worse yet, flows of services from capital stocks, is a recurrent theme in the empirical literature.

At the extreme, there may be no observable counterpart to the theoretical variable. The literature on the permanent income model of consumption [e.g., Friedman (1957)] provides an interesting example.

We assume that each observation in a sample $(yi , xi1, xi2, \ldots , xiK)$, $i = 1, \ldots , n$, is generated by an underlying process described by $yi = xi1\beta1 + xi2\beta2 + \cdots + xiK\beta K + \varepsilon i$ .The observed value of yi is the sum of two parts, a deterministic part and the random part, εi .

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Study Area

The study was conducted in Nigeria. Nigeria is located in West Africa on the Gulf of Guinea and has a total area of 923,768 km^2 (Ocean Data and Information Network for Africa, 2014). The country is bordered to the North by Niger, to the East by Chad and Cameroon, to the South by the Gulf of Guinea of the Atlantic Ocean, and to the West by Benin. Nigeria lies between Latitudes 4° and 14°N and Longitudes 2° and 15°E (World Fact Book, 2011). Nigeria is the most populous country in Africa with over 200million people, and the seventh largest in the world (NBS, 2022). The United Nations forecasts that the population will double by 2050, making it the third largest country in the world (UNDESA, 2019). The country came as an amalgamation of Northern and Southern protectorate, and hence there are 36 states and the Federal Capital Territory, Abuja. The states are aggregated into six geopolitical zones: North West, North East, North Central, South East, South-South and South West (Federal Research Division, 2008).

Nigeria has two major seasons, namely, the rainy and dry seasons. The rainy season in Nigeria varies across the agro-ecological zones. In the south, rain begins in March/April, with the peak of rainfall occurring in June/July, and peak dry season occurs between November and January. In the north, the rainy season starts in April, with a peak in June/July, and the dry season occurs between early to mid-October and mid-April (USAID, 2015). The country has five agro-ecological zones suitable for growing a wide range of crops, leading to diverse cropping systems across regions. The zones include the Sahel and Sudan Savannahs in the north; the Guinea and

Derived Savannahs in the middle belt; and the Humid Rainforest in the south. The climate conditions in these zones largely reflect the presence of rainfall, with the wet southern zones bordered by the Atlantic Ocean, and dry northern zones bordered by the Republic of Niger on the edge of the Sahara Desert. The bulk of farming activity occurs during the rainy season, which lasts from May to November in the south and July to September in the north. Little farming takes place during the dry season, as it is labour intensive and costly for smallholder farmers to irrigate (USAID, 2016). The major food staples produced are cassava, yam, cowpea, sorghum, rice and maize and the major cash crops include cocoa, oil palm, cotton, groundnuts, ginger and sesame. The common livestock animals reared in Nigeria are chicken, cow, cattle, pigs, goats, rabbits and fish.

3.2 Sampling Techniques

The study was carried out in Nigeria with the different maize value chain actors' beneficiaries of CADP project across the country as the study population. A multi-stage sampling technique was used in the selection of sample from this population. The programme was selected to run in five (5) states, which include Lagos, Cross River, Enugu, Kano and Kaduna States. However, the maize project was only accommodated in just three out of the five states and they are; Enugu, Kano and Kaduna State. In the first stage, a purposive selection of the three states with the maize projects was done. This is because, the targeted maize value chain activities supported by CADP were predominant in these three states in the country and this helped the study to obtain a representative sample. The states have agricultural administrative zones with the Ministry of Agriculture and Natural Resources.

The three states with a total of ten (10) agricultural zones including; three (3) zones from Enugu (Chukwuemeka et al., 2018), four (4) in Kaduna state and three (3) in Kano state (Tafida and Fiagbomeh, 2021) have a total population of 1420 maize value chain actors as CADP beneficiaries. Enugu has a population of 438 beneficiaries while Kano and Kaduna has 462 and 520 maize value chain actors with CADP in them respectively. In the second stage, a simple random sampling technique was used to draw only one (1) agricultural zone from each of the selected states participating in the CADP into the sample, making a total of three (3) zones. The total population of maize value chain actors in the three selected zones is 540 and they include; Nsukka zone in Enugu State with a population of 167 registered actors, the Northern Guinea Savannah Zone in Kano State has 175 registered maize value chain actors with CADP and the Samaru Zone in Kaduna State has 198 maize value chain actors who are beneficiaries of CADP.

In the third stage, two CADP participating LGAs with the majority of all the three major maize value chain actors were purposively selected from each of the selected zones. This gave a total of six (6) LGAs for the study. The LGAs are Udeni and Uzo-Uwani in Nsukka zone. Rogo and Wudil-Kana were selected from Kano State while Bimin-Gari and Zaria were drawn from Kaduna State. The selected LGAs were isolated from the total population to obtain a sample frame of all the maize value chain actors in them. The sample frame, which contain the communities, villages and their corresponding maize value actors were used in the selection of the respondents for the study.

In the fourth stage, ten (10) communities that are participating in the project with the particular village housing the enterprise were purposively selected giving a total of sixty (60) communities with sixty (60) villages in the sample. The maize value chain actors are within these communities

and the lists of direct beneficiaries, Commodity Interest Groups (CIGs) and Commercial Agricultural Development Associations (CADAs) in each of the selected villages were used in the separation of CADP maize beneficiaries in the list into the three actors of value chain activities of production, processing and trading across the selected communities with their villages.

The fifth and final stage was the separation of the beneficiaries into maize producers, processors and traders and proportion to size of 50% cut across the different actors in the sample frame was done using a stratified random sampling technique. A total sample of 360 different maize value chain actors as respondents, were drawn into the sample. The respondents were administered with a well structure and open ended questionnaire to elicit different information on their socioeconomic, instruction based activities, quantity of input and output used in their production, processing and marketing activities and challenges etc. The study found only 319 of the total responses valid and used for the data analyses.

Table 3.1 Sample Selection

	LGA	No. of Comm. (Villages)	Producers		Processors		Traders		Column Total	
			Sample Selected	Sample Used	Sample Selected	Sample Used	Sample Selected	Sample Used	Total Sample Selection	Total Sample Used
Enugu State (438); Nsukka Zone (167)										
Udaenu	59	10 (10)	30	27	14	12	15	13	59	
Uzo-Uwani	52	10 (10)	24	21	18	15	10	10	52	98
Total	111									
Kano State (462); Northern Guinea Savanna Zone(175)										
Rogo	54	10 (10)	26	23	15	14	13	11	54	
Wudil Kana	63	10 (10)	31	27	19	16	13	13	63	104
Total	117									
Kaduna State 520; Samaru Zone (198)										
Birnin- Gwari	54	10 (10)	32	31	11	9	11	6	54	
Zaria	78	10 (10)	38	36	25	23	15	12	78	117
Row Total	132		181	165	102	89	77	65	**360**	**319**

Source: Field Survey 2022

3.3 Data Collection

This study employed both primary data and secondary information. The primary data was collected using structured questionnaire, and administered to three hundred and sixty (360) respondents. The study found only 319 of the total responses valid and used for the data analyses. The variables include the socioeconomic characteristics of the CIGs members, gender participation and involvement, current CADP performance relative to baseline, grants approved, level of production, processing and sales relative to baseline and institutional factors constraining the implementation of CADP. The secondary information was obtained from the Project Concept Notes (PCN), Draft Project Appraisal Document (PAD) and Integrated Safeguards Data Sheet (ISDS)of the CADP project.

3.4 Data Analysis

Data collected for this study will be analyzed using descriptive statistics, functional analytical tool, Duncan Dissimilarity Index (DDI), performance index, multivariate regression technique, multivariate probit model and principal component analysis.

Objective (i) was realized using descriptive statistics.

Objective (ii) was analyzed using the functional analytical tool (Value Chain Mapping).

Objective (iii) was analyzed using Duncan Dissimilarity Index (DDI).

Objectives (iv) and (v) was analyzed using performance index.

Objective (vi) was analyzed using multivariate regression technique.

Objective (vii) was analyzed using multivariate probit model.

Objective (viii) was analyzed using the Principal Component Analysis (PCA).

Hypothesis I was realized from the results of objective (vi) using F-statistics.

Hypothesis II was realized from the results of objective (vii) using the likelihood Chi-square Statistics.

3.4.1 Roles and economic operations of commodity interest groups (CIGs) along Maize value chain

The functional and institutional analysis as described by FAO (2005) was used to identify the roles and operations of commodity interest groups in maize value chain. This was carried out by identifying and charting existing maize value chain. The roles and responsibilities of the commodity interest groups in the chain, the type of activities that they are mostly involved in, and different maize markets and maize products sold will be identified. The results were presented either in a table or in a flow chart. The first step includes drawing an initial map, which shows the chain boundaries including the main actors, activities, connections and some initial indicators of size and importance. The second step consists of elaborating the refined map by quantifying key variables such as the level of gender involvement supported by the project, level of performance of CADP relative to baseline and the major institutional factors constraining CADP implementation.

3.4.2 Level of Gender involvement and Segmentation Supported by CADP in Maize Value Chain

The Duncan Dissimilarity Index (DDI) was used to assess the level of gender involvement and segmentation supported by the project in maize value chain. Duncan Index explores different measures of segmentation and involvement by gender in different nodes of the value chain. The model is stated as (USAID, 2009):

$$D_j = 100\left[\frac{1}{2}\right]\sum_{i=1}^{N}\left|\frac{f_j}{F} - \frac{m_j}{M}\right| \qquad (3.1)$$

Where,

D_j = Duncan dissimilarity index for gender involvement in the jth stage (percent)

f_j = number of female beneficiaries involved in the j^{th} stage.

F = Total number of female in the population

m_j = number of male beneficiaries involved in the jth stage.

M = Total number of male in the population

N = Number of stages.

Duncan Dissimilarity Index (DDI) ranges from 0 to 100. An index of 0 indicates that involvement in the jth stage is not gender-segregated, and that female and male actors are distributed across these stages in proportion to their total engagement in the value chain. An

index of 100 indicates that participation by male and female actors are entirely different in these stages along the maize value chain.

3.4.3 Performance of the Maize Value Chain Relative to Baseline Production, Processing and Sales

The performance of maize value chain relative to baseline production, processing and sales was assessed using the performance index. Aggregate national data from the Project Appraisal Document (PAD) and Integrated Safeguards Data Sheet (ISDS) of the CADP project was used. The index measures the percentage change and contribution of the current production, processing and sales to baseline values. The model is stated as:

$$\%P_i = \left[1 - \frac{Current\ Value - Baseline}{Current\ Value}\right] \times 100 \qquad (3.2)$$

Where,

$\%P_i$ = performance index (percent)

3.4.4 Socioeconomic Factors of the Commodity Interest Groups that Influence the Production, Processing and Sales Performance of Maize Value Chain

The socioeconomic factors of the commodity interest group that influence the production, processing and sales performance of maize value chain was estimated using the multivariate regression technique. The use of multivariate regression model becomes most suitable for isolating the factors that account for the variation in production, processing and sales performance of the respondents at the same time. This is because the cause and effect

relationship among other determinants may not mutually exclusive as explanatory variable may have more than one effect on more than dependent variable.

The performance index generated using the model stated in Equation (3.2) for production, processing and sales was used as the dependent variable. The multivariate regression model is stated as (Greene, 2012):

$Y_{1i} = f(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, e_1)$ Production node Eqn 3.3

$Y_{2i} = f(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, e_2)$ Processing node Eqn 3.4

$Y_{3i} = f(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, e_3)$ Sales node Eqn 3.5

Where,

$\boldsymbol{Y_{1i}}$ = Production of the ith actor in the chain (percent)

$\boldsymbol{Y_{2i}}$ = Processing of the ith actor in the chain (percent)

$\boldsymbol{Y_{3i}}$ = **S**ales of the ith actor in the chain (percent)

X_1= Age (years)

X_2= Household size (Number of persons)

X_3= Educational attainment (years)

X_4= Experience (years)

X_5= Marital status (Dummy variable 1=married; otherwise, 0)

X_6= Sex (dummy variable where Male = "1" otherwise "0")

X_7= Value added to maize product at different mode (Naira)

X_8= Amount disbursed (Naira)

$\mathbf{e}_1 - \mathbf{e}_3$= error terms.

It is apriori expected that **$X_2, X_3, X_4, X_5, X_6, X_7 > 0$; While X_1, and $X_8 < 0$**

3.4.5 Institutional and Socioeconomic Factors that affect the availability of matching grant to Commodity Interest Groups (CIGs) in Maize Value Chain

The multivariate probit model was used to determine the institutional and socioeconomic factors that affect the availability of matching grants to commodity interest group in maize value chain. This is because the choices among the reasons for the availability of funds are not mutually exclusive as respondents may choose more than one options. Hence random error terms (unobserved/unknown factors) are allowed to be freely correlated across different reasons for fund availability, as reported by Kassie *et al*. (2013). The method uses Geweke-Hajivassiliour-Keane smooth recursive conditioning simulator procedure to evaluate the multivariate normal distribution. The model is stated as (Jenkins *et al.,* 2011):

$$\left.\begin{aligned} Y_{i1} &= X'_{ij1}\beta_1 + e_{i1} \\ Y_{i2} &= X'_{ij2}\beta_2 + e_{i2} \\ Y_{i3} &= X'_{ij3}\beta_3 + e_{i3} \end{aligned}\right\} \qquad (3.6)$$

Where,

Y_{i1} = Choice of the ith CIG member when "funds are readily available' (Yes =1; otherwise = 0)

Y_{i2} = Choice of the ith CIG member when 'funding obeys the sharing formula (Yes =1; otherwise = 0)

Y_{i3} = Choice of the ith CIG member when 'there is group embezzlement (Yes =1; otherwise = 0)

X′i = Vector of institutional factors affecting the availability of matching grant

X_1 = Delays in approving funds by the world bank (dummy, 1= yes; otherwise = 0)

X_2 = Delays in approving funds by national coordinating office (dummy, 1= yes; otherwise = 0)

X_3 = Delays in approving funds by State Commercial Agricultural Development Office (SCADO) (dummy, 1= yes; otherwise = 0)

X_4 = Sex

X_5 = Management asks for gratification before approving funds (dummy, 1= yes; otherwise = 0)

X_6 = Level of education (years)

X_7= Farming Experience (years)

X_8= Annual income (Naira)

X_9= Age (years)

X_{10} = Household size (Number of persons)

βj = Vector of unknown parameters (j = 1, 2, 3), and

ε_{im} = is the error term.

The probability that all three reasons will be preferred is given as:

$$\Pr(Y_{i1} = 1, Y_{i2} = 2, Y_{i3} = 3,) = \Pr(e_{i1} \leq \beta X_{i1}, e_{i2} \leq \beta X_{i2}, e_{i3} \leq \beta X_{i3}) \quad \text{Eqn 3.7}$$

3.4.6 Factors Constraining the Implementation of CADP along Maize Value Chain

The constraining factors to CADP implementation along the chain was determined using the principal component analysis (PCA). The PCA was used to identify the important constraints. The model is stated as:

$$\mathbf{Y_1 = a_{11}X_1 + a_{l22}X_2 + \ldots + a_{1n}X_n} \qquad \textbf{Eqn 3.8}$$

$$\mathbf{Y_2 = a_{21}X_1 + a_{l22}X_2 + \ldots + a_{2n}X_n} \qquad \textbf{Eqn 3.9}$$

$$\mathbf{Y_3 = a_{31}X_1 + a_{l32}X_2 + \ldots + a_{3n}X_n} \qquad \textbf{Eqn 3.10}$$

$$\mathbf{Y_n = a_{n1}X_1 + a_{n2}X_2 + \ldots + a_{nn}X_n} \qquad \textbf{Eqn 3.11}$$

Where,

$\mathbf{Y_1, Y_2, \ldots, Y_n}$ = observed constraints among the value chain actors.

$\mathbf{a_l - a_n}$ = factor loading or correlation coefficients.

$X_1, X_2, \ldots, Xn$ = unobserved factors constraining the value chain actors.

3.4.7 Capital and Technology Inadequacy

Capital inadequacy = {Total Amount Required – Amount Disbursed / Amount Disbursed} *100

Technology Inadequacy (TI) = (No of Technology Needed – No Provided/ No provided} *100

3.5 Test of Hypotheses

3.5.1 Hypothesis I

The null hypothesis I that the socioeconomic factors of the commodity interest groups do not significantly influence the production, processing and sales performance of the targeted value chain in the area was realized from the results of objective (vi) using the F-statistics.

3.5.2 Hypothesis II

The null hypothesis that the institutional and socioeconomic factors do not significantly affect the availability of CADP's matching grant to Commodity Interest Groups (CIGs) in Maize Value Chain was realized from the results of objective (vii) using the likelihood chi-square statistics.

CHAPTER FOUR

RESULTS AND DISCUSSION

In this chapter, the results of the socioeconomic characteristics of the interest groups in the targeted value chain were presented and discussed. Also presented and discussed include the roles and operations in maize value chain, the level of gender involvement and segmentation supported by the project, the performance of maize value chain relative to baseline production, processing and sales and the factors constraining the implementation of CADP along maize chain

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4.1 Socioeconomic Characteristics of Maize Value Chain Actors

Table 4.1 shows the distribution of maize producers according to their socioeconomic characteristics

Table 4.1: Frequency Distribution of Socio Economic Characteristics of Maize Producers in CADP Programme in Nigeria

Variable		Kano		Kaduna		Enugu		Pooled	
		Freq	%	Freq	%	Freq	%	Freq	%
Age	25 - 34	15	30	18	26.9	8	16.7	39	23.6
	35 - 44	22	44	33	49.2	21	43.8	77	46.7
	45 - 54	9	18	15	22.4	14	29.2	38	23
	55 - 64	4	8	1	1.5	5	10.3	11	6.7
	Mean	**41**		**41**		**45**		**41**	
Education	None	2	4	6	9.0	2	4.2	11	6.7
	Primary	6	12	5	7.5	7	14.6	18	10.9
	Secondary	25	50	11	16.4	24	50	60	34.3
	Tertiary	17	34	45	67.2	15	31.3	76	46.1
Marital Status	Single	2	4	0	0	6	12.5	9	5.5
	Married	47	94	66	98.5	40	83.3	152	92.1
	Widowed	1	2	1	1.5	2	4.2	4	2.4
Household size	1 – 5	14	28	17	25.4	20	41.7	51	31
	6 – 10	21	42	28	41.8	23	47.9	72	43.5
	11 – 15	13	26	15	22.4	3	6.3	31	18.8
	>15	2	4	7	10.4	2	4.2	11	6.7
	Mean	**9**		**10**		**6**		**9**	
Farm Exp.	4 – 10	9	18	21	31.3	12	25	42	25.4
	11 – 20	26	52	23	34.3	23	48.0	65	39.5
	21 – 30	11	22	15	22.4	10	20.8	39	23.6
	31 – 40	3	6	6	9.0	3	6.3	16	9.7
	41	1	2	2	3.0	0	0	3	1.8
	Mean	**18**		**18**		**22**		**19**	
Major Occ	Artisan	1	2	2	3.0	1	2.1	3	1.8
	Business	0	0	4	6.0	3	6.3	7	4.2
	Civil Service	1	2	7	10.4	4	8.3	12	7.3
	Farming	48	96	54	80.6	40	83.3	143	86.7
Sex	Female	3	6	6	9.0	23	47.9	33	20
	Male	47	94	61	91.0	25	52.1	132	80
Farm Size	0 - 0.9	4	8	15	22.4	26	54.2	22	13.3
	1.0 - 1.9	12	24	11	16.4	5	10.4	36	21.8
	2.0 - 2.9	15	30	10	14.9	3	6.3	36	21.8
	3.0 - 3.9	9	18	8	11.9	2	4.2	28	17.0
	4.0 - 4.9	4	8	8	11.9	8	16.7	18	10.9
	> 5	6	12	15	22.4	4	8.3	25	15.2
	Total	**50**	**100**	**67**		**48**	**100**	**165**	**100.0**
	Mean	**2.75**		**2.90**		**1.89**		**2.81Ha**	

Source: Field Survey 2022

From Table 4.1, 44% of the respondents were aged 35 – 44 years with mean age of 41 in Kano state, while 49.2% fell within the age range of 35 – 44 years with mean age of 41 in Kaduna state and 43.8% of the respondents were aged between 35 – 44 years with a mean age of 45 in Enugu

state. This indicates that a large proportion of the respondents are within the age range of 35 – 44 years and are still physically active. This result is similar to the findings of Issa *et.al.* (2016) who found that the mean age for maize farmers was 40years and that maize farmers were young and expected to have more energy to practice maize farming. The mean age from the pooled data was 41 which is an indication that the respondents sampled were predominantly middle aged. This is in line with the findings of Aduba *et al*., (2013) who pinpoints the importance of age, as individuals grow older, their energy levels typically decline. Although experience is gained with age, farming needs not be dominated with aged populations in any region as this could have negative implications on the future of food production in such region.

The result shows that majority of the maize producers are educated. This is evident in their pooled result of 46.1%. Education enable farmers take informed decision and understand technicalities involved in new farm ideas and innovations. Therefore, introduction of new ideas and adoption of new innovations and technology into the study areas will be easy. This will in turn increase yield, income and agricultural production in general (Salau, 2013).

Distribution of the respondents based on marital status showed that majority of them were married. The table shows that 94% of the respondents in Kano, 98.5% of the respondents in Kaduna and 83.3% of the respondents in Enugu were married and living with their spouses. This result indicates that the responsibilities shouldered by married people ensures commitment to farming activities if their needs are to be met. This is in line with the findings of Mkpado & Omowole (2020) that a sense of responsibility of married people is capable of prompting them to put more commitment to their business and consequently enhance productivity towards meeting their family needs and obligations.

The mean household size of the respondents were 9 persons per household in Kano, 10 persons per household in Kaduna and 6 persons per household in Enugu state. The pooled mean was 9 persons per household. This implies that the households were relatively large and there is availability of family labour. Oyetunde-Usman & Olagunju (2019) opined that a large household size is a plus for family labour use in farmlands.

The table further shows that the respondents were reasonably experienced. This is indicated in their pooled mean of 19 years. According to Chikezie *et al.*, (2012) many years of farming experience will help farmers to make sound decisions as regards resource allocation and management of their farms.

The table also shows that 94%, 80.6% & 83.3% of the respondents were male in Kano, Kaduna and Enugu State respectively while 6%, 10.4% & 8.3% are female in Kano, Kaduna and Enugu State respectively. This implies that farming is a male dominated activity where land ownership is predominantly male. A finding like this may be attributed to the tradition and custom of the people where only the male own land. Furthermore, women are into other non-farm activities and also domestic activities such as taking care of the family and cleaning the house (Musa, 2011).

4.1.2 Socioeconomic Characteristics of Maize Processors

Table 4.2 shows the distribution of maize processors according to their socioeconomic characteristics

Table 4.2: Frequency Distribution of Socio Economic Characteristics of Maize Processors in CADP Programme in Nigeria

Variable		Kano		Kaduna		Enugu		Pooled	
		Freq	%	Freq	%	Freq	%	Freq	%
Age	25 - 34	4	13.3	2	6.25	6	22.2	12	13.5
	35 - 44	14	46.7	13	40.63	12	44.4	39	43.8
	45 - 54	9	30	7	21.88	8	29.6	24	27.0
	55 - 64	3	10	10	31.25	1	3.7	14	15.7
	Total	30	100	32	100	27	100	89	100
	Mean	**44**		**48**		**42**		**45 years**	
Education									
	None	0	0	0	0	0	0	1	1.1
	Primary	7	23.3	3	9.3	5	18.5	15	16.9
	Secondary	16	53.3	16	50	11	40.7	43	48.4
	Tertiary	7	23.3	13	40.6	11	40.7	21	23.6
	Total	**30**	**100**	**32**	**100**	**27**	**100**	**89**	**100**
Mart. Sta.	Married	26	86.7	31	96.9	20	74.1	77	86.5
	Single	3	10	0	0	7	25.9	10	11.2
	Widowed	1	3.3	1	3.1	0	0	2	2.3
	Total	**30**	**100**	**32**	**100**	**27**	**100**	**89**	**100**
Household Size									
	1 – 5	11	36.7	10	31.3	8	29.6	29	32.6
	6 – 10	18	60	21	65.6	17	63.0	57	64.0
	11 – 15	1	3.3	1	3.1	2	7.4	3	3.4
	>15	0	0	0	0	0	0	0	0
	Total	**30**	**100**	**32**	**100**	**27**	**100**	**89**	**100**
	Mean	**7**		**6**		**6**		**7**	
Farming Exp									
	4 – 10	6	20	15	46.9	7	25.9	28	31.5
	11 – 20	10	33.3	11	34.4	12	44.4	32	36.0
	21 – 30	10	33.3	2	6.3	7	25.9	20	22.4
	31 – 40	4	13.3	3	9.4	1	3.7	8	9
	>41	0	0	1	3.1	0	0	1	1.1
	Total	**30**	**100**	**32**	**100**	**27**	**100**	**89**	**100**
	Mean	**20.1**		**16**		**18.5**		**18**	
Major Occ									
	Artisan	3	10	2	6.3	5	18.5	2	2.2
	Business	4	13.3	7	21.9	0	0	16	18.0
	Civil Service	1	3.33	0	0	22	81.5	0	0
	Farming	22	73.3	23	71.9	27	100	71	79.8
	Total	**30**	**100**	**32**	**100**	**54**	**100**	**89**	**100**
Sex	Female	12	40	11	34.4	13	48.1	36	40.4
	Male	18	60	21	65.6	14	51.9	53	59.6
	Total	**30**	**100**	**32**	**100**	**27**	**100**	**89**	**100**

Source: Field Survey 2022

From Table 4.2, 46.7% of the respondents were aged 35 – 44 years with mean age of 44 in Kano state, while 40.6% fell within the age range of 35 – 44 years with mean age of 48 in Kaduna state and 44.4% of the respondents were aged between 35 – 44 years with a mean age of 42 in Enugu state. This indicates that a large proportion of the respondents are within the age range of 35 – 44 years. This result is in line with the findings of Osuafor et al. (2020) that processors at their active farm age can still adopt new innovative technology. The mean age from the pooled data was 45 which is an indication that the respondents sampled were predominantly middle aged.

Distribution of the respondents based on the highest educational qualification obtained shows that 53.3% of the respondents in Kano state had secondary education, 50% of the respondents in Kaduna state had secondary education while 40.7% of the respondents in Enugu had secondary and tertiary education. This implies that majority (48.4) of the farmers had secondary school education and are literate enough to make more informed farming decisions which can positively affect productivity. This agrees with the findings of Adenuga *et. al.* (2013) that education has the tendency to significantly improve agricultural productivity.

The pooled data of the respondents showed that 86.5% of the respondents are married, 11.2% are single and 2.3% of the respondents are widowed. This indicates that majority of the maize processors in the study area are married and carter to the basic needs of their households such as food, shelter, clothing, and healthcare from the proceeds of their farming activities. According to Akerele (2019) marital status is expected to influence respondents' level of responsibilities which could have a positive or negative influence on their disposition to economic activities.

The mean household size of the respondents were 7 persons per household in Kano, 6 persons per household in Kaduna and 6 persons per household in Enugu state. The pooled mean was 7

persons per household. According to Osuafor *et.al*.(2020) large household size will provide cheap family labour which will help to reduce the cost incurred on labour in the industry.

The pooled data of the respondents show that the respondents had 18years of farming experience. This implies that the respondents in the study area have a good knowledge of maize processing activities which is vital in the acceptance and application of new agricultural technologies and or innovations. This conforms to the findings of Awotide *et. al*. (2010) that the number of years of experience in farming influences to a large degree the adoption of new technologies. According to Oyelade & Anwanane (2013) experience is a valuable asset, it could enable the farmer understand times and seasons, easy access to input procurement, risk management, easy processing strategies among others.

The pooled data of the respondents further showed that 59.6% of the respondents were male while 40.4% were female. This result showed that the females in the study area actively participated in the processing of Maize. James *et.al.,* (2013) in his study affirmed that women are heavily involved in food processing by way of threshing, shelling and milling of grains. Ajani (2008) also opined that in most societies food processing is the responsibility of women. This is not so in this study as the males were more involved in maize processing than their female counterpart in the study area, this could be attributed to the customs and tradition as well as the insecurity in the study area.

4.1.3 Socioeconomic Characteristics of Maize Marketers

Table 4.3 shows the distribution of Maize Marketers according to their socioeconomic characteristics

Table 4.3: Frequency Distribution of Socio Economic Characteristics of Maize Traders in CADP Programme in Nigeria

Variable		Kano		Kaduna		Enugu		Pooled	
		Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Age	25 - 34	8	33.3	5	27.8	5	21.7	18	27.7
	35 - 44	10	41.7	10	55.6	14	60.9	34	52.3
	45 - 54	6	25	2	11.1	4	17.4	12	18.5
	55 - 64	0	0	1	5.6	0	0	1	1.5
	Mean	**44**		**41**		**41**		**42**	
Education	None	0	0	0	0	3	13.0	0	0
	Primary	5	20.8	3	16.7	2	8.7	13	20
	Secondary	12	50	7	38.9	12	52.2	31	47.7
	Tertiary	7	29.2	8	44.4	6	26.1	21	32.3
Marital Sta.									
	Married	17	70.8	14	77.8	12	52.2	44	67.7
	Single	7	29.2	4	22.2	8	34.8	19	29.2
	Widowed	0	0	0	0	3	13.0	2	3.1
Household size	1 – 5	12	50	9	50	6	26.1	27	41.5
	6 – 10	10	41.7	6	33.3	14	60.9	30	46.2
	11 – 15	1	4.7	2	11.1	3	13.0	6	9.2
	>15	1	4.7	1	5.6	0	0	2	3.1
	Mean	**7**		**9**		**8**		**8**	
Experience	4 – 10	0	0	5	27.8	4	17.4	9	17.4
	11 – 20	13	54.2	5	27.8	10	43.5	28	43.5
	21 – 30	7	29.2	5	27.8	7	30.4	19	30.4
	31 – 40	4	16.6	2	11.1	2	8.7	8	8.7
>41		0	0	1	5.5	23	100	1	0
	Mean	**21**		**19**		**19**		**20**	
Maj Occt	Artisan	0	0	0	0	4	17.4	1	1.5
	Business	13	54.2	9	50	10	43.5	37	56.9
	Civil Service	0	0	9	50	7	30.4	2	3.1
	Farming	11	45.8	0	0	2	8.7	35	53.8
Sex	Female	6	25	3	16.7	9	39.1	14	21.5
	Male	18	75	15	83.3	14	60.9	51	78.5
	Total	**24**	**100**	**18**	**100**	**23**	**100**	**65**	**100**

Source: Field Survey 2022

From Table 4.3, 41.7% of the respondents were aged 35 – 44 years in Kano state, while 55.6% fell within the age range of 35 – 44 years in Kaduna state and 60.9% of the respondents were aged between 35 – 44 years in Enugu state. The pooled mean of the respondents was 42years. This result agrees with the findings of Akinniran et al, (2018) who stated that the maize

marketers are relatively young, and still in their active age with an average age of 43years and thus enhance effective and efficient marketing of maize.

The table further revealed that a greater proportion (47.7%) of the respondents have formal education. This will help in their decision making process and adoption of innovations and technologies. Gizaki & Madukwe (2019) asserted that education plays a significant role in skill acquisition and technology transfer. It enhances technology adoption and the ability of farmers to plan and take risks.

The pooled data of the respondents show that 67.7% of the respondents are married, 29.2% are single and 3.1% of the respondents are widowed. This indicates that majority of the maize marketers in the study area are married and can get financial support from their spouses to increase their product sales. This is in line with the findings of Obetta et. al, (2020) that a larger proportion of marketers who were married could access extra financial, physical and moral support from their spouses which could boost their capital.

The pooled data of the respondents further showed that 78.5% of the respondents were male while 21.5% were female implying that the men were more involved in marketing of maize than their female counterparts. This finding is different from that Adam et al, (2019) who found out that women participated more in marketing than men because they are better suited than men at convincing customers to pay the stated price.

4.2 Commodity Interest Groups, Roles and Operations in Maize Value Chain

4.2.1 Roles and Economic Operations in Maize Value Chain in Nigeria

Table 4.4 shows the distribution of respondents based on roles and functions in maize value chain in Nigeria

Table 4.4 shows the distribution of respondents based on roles and functions in maize value chain in Kano, Kaduna and Enugu states. The capital for the farming activities of the various actors were generated from external sources which include savings and loans (30%), counterpart funds (20%) and grant (50%) from Commercial Agriculture Development Project (CADP). The pooled result showed that the average total amount of capital required by the male and female maize producers was ₦526,013.3 and ₦506,091 respectively while ₦434,367.5 and ₦487,090.5 were the amount of capital obtained for their farming activities. This showed there was a 17% inadequacy in funding for the male producers and 3.8% for their female counterparts.

The pooled result further showed that the amount of capital required by the male and female maize processors was ₦700,000 and ₦912,735.9 respectively and the amount obtained for the male and female processors were ₦657,477.329 and ₦807,832.121. The male and female processors experienced a 0.17% and 0.13% inadequacy in funding.

Table 4.4 Distribution of Respondents based on roles and functions in maize value chain of Nigeria

Actors/Gender		Capital				% Inadequacy	Final Product	Quantity of Product	% Fund Delay	Production		Returns to Capital	End Dist. Channel
		Total Required (Save + CPF) + Access		Obtained (Save + CPF) + Disbursed						TC/Ha	Profit/Ha		
Producers													
Pooled	Male	175339.1	350674.2	83693.3	350674.2	17.0	Maize Grain	43300	86.47	115801.4	99929.48	34.8%	PM (61.3%)
	Female	163363.7	342727.3	144363.2	342727.3	3.8	Maize Grain	60803	56.25	190011	78098.2	41.1%	Mkt (81.2%)
Kano	Male	236793.5	473587.0	175227.18	473587.0	8.6	Maize Grain	37323.9	73.9	102456.6	54887.4	53.6%	PM (75.0%)
	Female	100000.0	200000.0	46560.45	200000.0	17.8	Maize Grain	48950	50.0	107734.4	38978.9	36.2%	Mkt (71.7%)
Kaduna	Male	131443.5	262887.1	98778.77	262887.1	8.3	Maize Grain	36130.7	91.9	53554.2	34778.6	64.9%	PM (91.9%)
	Female	151000.0	302000.0	132556.67	302000.0	4.07	Maize Grain	12720	100.0	91445.8	47998.9	52.4%	Mkt (60.0%)
Enugu	Male	194100	388200.0	92113.66	388200.0	17.5	Maize Grain	72076	92.0	140098.6	29841.0	21.3%	Mkt (80.0%)
	Female	186956.5	373913.0	158778.10	373913.0	5.02	Maize Grain	73317.4	34.8	122367.3	351194.2	28.7%	PM (82.6%)
Pooled	Male	256666.7	513333.3	144143.9991	513333.33	0.17	Corn Flour	29219	49.1	467.24/ton	116.55/ton	24.9%	Mkt (77.4%)
	Female	304245.3	608490.6	199341.5206	608490.6	0.13	Corn Flour	44708.3	100	419.91/ton	95.42/ton	22.7%	Mkt (89.3%)
Kano	Male	204166.6	408333.3	95549.9922	408333.3	0.22	Corn Flour	23722.2	72.2	553.56/ton	154.44/ton	27.9%	Mkt (69.5%)
	Female	204166.7	408333.3	129359.9894	408333.3	0.14	Corn Flour	22916.7	83.3	408.66/ton	51.90/ton	12.7%	Mkt (88.6%)
Kaduna	Male	455952.4	911904.8	206820.0086	911904.8	0.22	Corn Flour	36547.6	72.9	467.69/ton	90.73/ton	19.4%	Mkt (66.8%)
	Female	355909.1	711818.2	240879.2789	711818.2	0.12	Corn Flour	56500	81.8	501.23/ton	103.75/ton	20.7%	Mkt (78.9%)
Enugu	Male	205357.2	410714.3	103500.0036	410714.3	0.20	Corn Flour	25285.7	71.4	445.88/ton	82.49/ton	18.5%	Mkt (56.8%)
	Female	221153.9	442307.7	154453.8488	442307.7	0.11	Corn Flour	54846.5	69.2	507.33/ton	140.53/ton	27.7%	Con (88.7%)
Pooled	Male	135800.0	271600.00	80936.8	271600.0	0.13	Corn Flour	85620	96.0	784.04/ton	118.92/ton	6.59%	PM (60.0%)
	Female	261666.7	523333.3	198866.6667	523333.33	0.08	Corn Flour	130133.3	100.0	313.06/ton	72.30/ton	4.33%	Con (66.4%)
Kano	Male	119444.4	238888.9	76444.44444	238888.9	0.12	Maize Grain	155333.3	94.4	633.68/ton	116.70/ton	5.43%	PM (74.3%)
	Female	341666.7	683333.3	252833.3333	683333.3	0.08	Corn Flour	65777.8	100.0	387.07/ton	99.76/ton	3.88%	Con (88.5%)
Kaduna	Male	168888.9	337777.8	93902.22222	337777.8	0.15	Corn Flour	119666.7	93.3	478.27/ton	117.8/ton	4.06%	PM (80.0%)
	Female	391666.7	783333.3	321166.6667	783333.3	0.06	Corn Flour	180000	100.0	436.71/ton	109.45/ton	3.99%	Con (66.7%)
Enugu	Male	139705.9	279411.7	64264.70588	279411.8	0.18	Maize Grain	76588..2	100.0	1384.28/ton	478.99/ton	2.89%	PM(56.1%)
	Female	200000.0	400000.0	140000.0	400000.0	0.10	Corn Flour	80000	100.0	273.96/ton	224.56/ton	1.22%	Con (83.3%)

Source: Field Survey 2022

PM – Producer-Marketer

Mkt – Marketer

Con - Consumer

The male and female maize marketers required an average amount of ₦407,400 and ₦785,000 for their business but obtained ₦352,536.8 and ₦722,199.9 respectively. The capital inadequacy was 0.13% for the male marketers and 0.08% for the female marketers.

The result revealed that the male producers had the highest percentage (17%) of capital inadequacy which invariably affected the rate of returns. This result is in line with Okeke and Chukwuemeka (2018) that credit is a catalyst in production, the increasing flow of which may result in improved per hectare productivity.

All the actors across the state had the same final products of maize grains and corn flour. The producers across the three states namely Kano, Kaduna and Enugu state had maize grains as their final product, majority of the processors had corn flour as their final product while the marketers had maize grains and corn flour as their final product.

The pooled result further showed that 86.47% of the male producers and 56.25% of the female producers complained about delay in fund disbursement, 49.1% of the male processors and 100% of the female processors also complained about delay in fund disbursement and 96% of the male marketers and 100% of the female marketers agreed that there was delay in fund disbursement. This result is consistent with the findings of Hawonga & Misook (2018) and Keng'ara (2014) that funds were inconsistently disbursed because officers were untimely and sometimes failed to account for previously used funds and it can take up to 15months for a project to receive the first disbursement of funds after signing of loan protocol agreement between the government and the donor.

Enugu male and female producers had the highest total cost of production of ₦140,098.6 and ₦122,367.3 while Kaduna male and female producers had the lowest total cost of production of ₦53,554.2 and ₦91,445.8 respectively. The high cost of production in Enugu state invariably affected their return as they had the lowest returns to capital of 21.3% and 28.7% for the male and female producers respectively. Bad road, hike in transportation fare, and delay in product delivery all contributed to the high cost of production in Enugu state.

Male and female processors across the three states namely Kano, Kaduna and Enugu states had the lowest rate of return (ranging between 1.22% - 6.59%) compared to the Producers and Marketers in the study area. This is due to the high processing cost, storage as well as transportation cost incurred by the actors.

The male marketers in Enugu state made the highest sales of ₦1384.28/ton but the return to capital (2.89%) was lower than their counterparts in Kano and Kaduna state. This is attributed to the high marketing costs (storage cost, bad road, hike in transportation fare) incurred by the male marketers.

The end channel distribution of the maize product showed that majority of the producers produce from the farm and sell to processors – marketers or directly to marketers. A few of the processors also sell directly to the consumers.

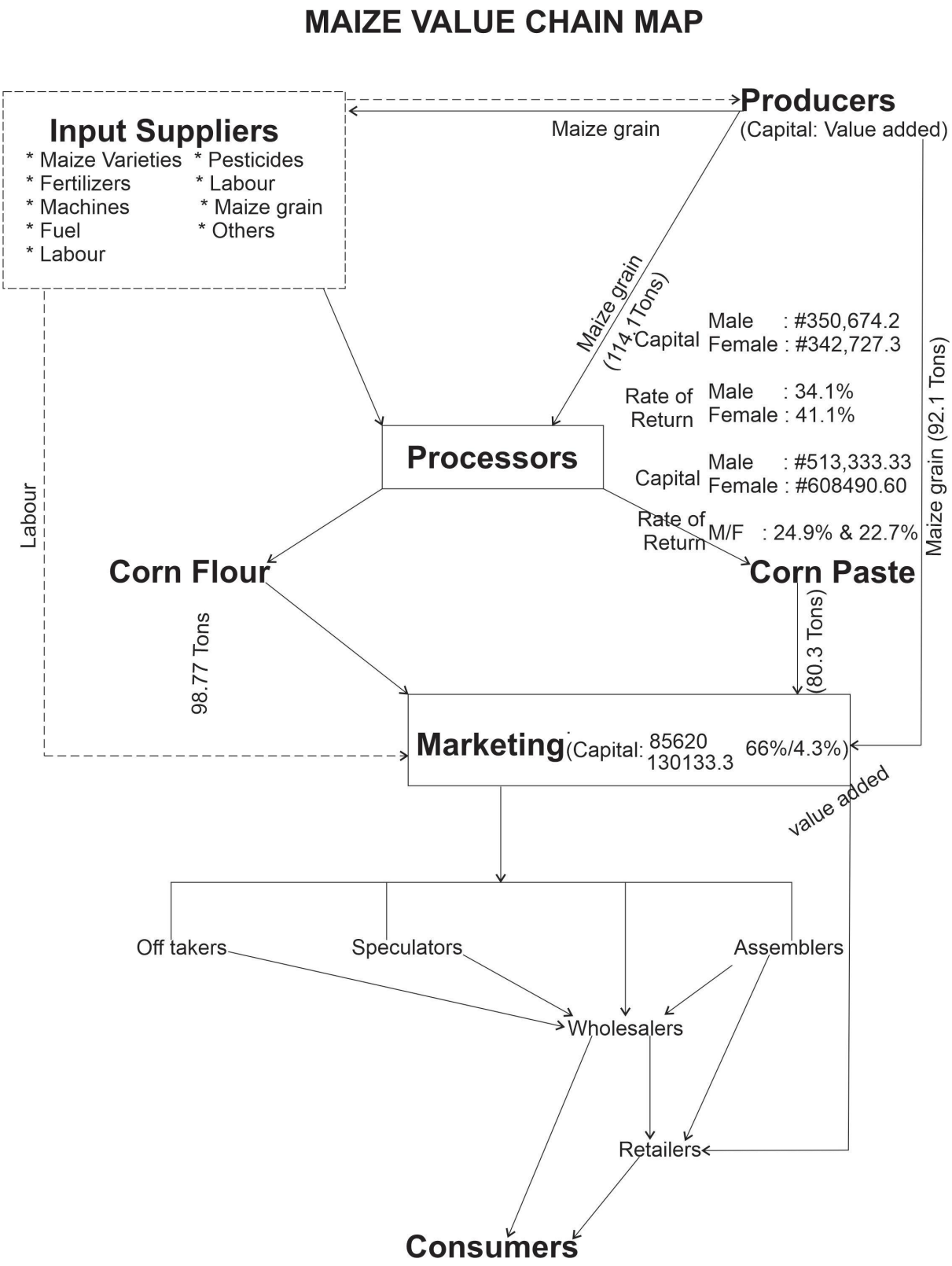

Fig 4.1: Maize Value Chain Map in Nigeria

Source: Field Survey 2022

The major actors in the Maize value chain are the producers, processors and Marketers. The producers produce the maize grains which is passed to the processors who process it into corn flour and corn paste (the two major products processed in the programme). These two products enter the market through the wholesalers and retailers and is finally passed to the consumers.

4.3 Gender involvement and Segmentation supported by CADP

Table 4.5 shows the level of gender involvement and segmentation supported by the project in the value chain

Table 4.5: Duncan Dissimilarity Index of some selected Gender Roles among CADP supported Target Value Chain in Nigeria

Actors	Location and Sex		Sex Distribution	Capital Disbursed (N)	Capital Inadequacy (%)	Output (N/ton)
	Kano	Male	47	473587	8.6	9311.3
		Female	3	200000	17.8	6881
	Dissimilarity Index (%)			-29.69	-1.198	-7.34
	Kaduna	Male	61	262887.1	8.3	6928.8
		Female	6	302000	4.07	2447.7
	Dissimilarity Index (%)			-12.36	2.224	-4.03
	Enugu	Male	25	388200	17.5	16332.4
		Female	23	373913	5.02	16767.7
oducers	Dissimilarity Index (%)			2.59	0.137	6.83
	Kano	Male	18	408333.3	0.22	28466.6
		Female	12	408333.3	0.14	28302.1
	Dissimilarity Index (%)			14.68	1.029	-3.62
	Kaduna	Male	21	911904.8	0.22	71585.5
		Female	11	711818.2	0.12	43491.6
	Dissimilarity Index (%)			8.86	2.097	-1.63
	Enugu	Male	14	410714.3	0.2	30906.7
		Female	13	442307.7	0.11	40066.4
Processors	Dissimilarity Index (%)			3.64	-0.293	11.68
	Kano	Male	18	238888.9	0.12	90747.2
		Female	6	683333.3	0.08	92680.9
	Dissimilarity Index (%)			15.01359	0.169	1.27
	Kaduna	Male	15	337777.8	0.15	168730
		Female	3	783333.3	0.06	179700
	Dissimilarity Index (%)			3.5046369	0.128	-2.28
	Enugu	Male	14	279411.8	0.18	113120.8
		Female	3	400000	0.1	119200
Marketers	Dissimilarity Index (%)			4.69	-0.157	18.51
	Grand Dissimilarity Index (%)			1.21	-035	1.872

Source: Field Survey Data 2022

The level of dissimilarity among male and female producers in Kano state and the proportion of dominance by women in the area of capital disbursement, capital inadequacy and output is -29.69%, -1.198% and -7.34% respectively. In Kaduna state, the male actors also had a dissimilarity index of -12.36% and -4.03% in the area of capital disbursement and output respectively, this means that the male producers in Kaduna state will need extra 12.36% and 4.03% in the area of capital disbursement and output to be at parity with their female counterparts.

The male producers in Kano state had a dissimilarity index of -3.62% in output, this indicates that they were more disadvantaged and their female counterparts dominated in the area of output. The male producers in Enugu state will also need additional 1.63% output to be at parity with their female counterparts.

The percentage of dissimilarity between female and male marketers in Kaduna state and the proportion of women in the area of output is 2.28% and in the area of capital inadequacy, its 0.157% in Enugu state.

The pooled result of the level of dissimilarity index showed that the female actors in the study area dominated in the area of capital disbursed and output. This means that 1.21% of capital disbursed and 1.872% of output favored the females than their male counterparts. The result further showed that 0.35% of inadequate capital procurement were from the male actors than their female counterparts. This result means that the female actors are more capital adequate and this could be because the females are making more effort in adding capital from external sources which positively affects their output(productivity). This result is in line with the findings of

Taremwa *et. al.* (2021) that agricultural credit was important for productivity and had a more significant impact on maize as opposed to rice.

4.4 Performance of Maize Value Chain relative to Baseline in terms of CIG's Technology Adequacy and Demographic Variables

Table 4.6 shows the performance of maize value chain relative to baseline in terms of CIG's technology adequacy and demographic variables

Table 4.6: Performance of CADP relative to baseline in terms of CIGs' Technology Adequacy and demographic variables

States	Variables	Base Year (B)	Current Year (C)	(C –B)/C	(1-(C-B)/C)100	Performance Index
Enugu	%Technology Adequacy	48	64.6	0.257	0.743	74.3
	% Female Membership	14	45	0.689	0.311	31.1
	% School Attended	97.9	91.5	-0.069	1.070	107
	Age	29	41	0.293	0.707	70.7
	Household size	6	8	0.25	0.75	75.0
Kaduna	%Technology Adequacy	50	56.4	0.113	0.887	88.7
	% Female Membership	3	20	0.85	0.15	15.0
	% School Attended	97.9	91	-0.076	1.076	107.6
	Age	25	41	0.390	0.610	61.0
	Household size	8	9	0.111	0.889	88.9
Kano	%Technology Adequacy	45	59.6	0.245	0.755	75.5
	% Female Membership	3	24	0.875	0.125	12.5
	% School Attended	97.1	96	-0.011	1.0115	101.1
	Age	21	44	0.523	0.477	47.8
	Household size	8	7	-0.143	1.143	114.3
Pooled	%Technology Adequacy	47.7	58.3	0.182	0.812	81.8
	% Female Membership	12	30	0.6	0.195	19.5
	% School Attended	97.6	92.8	-0.0512	1.052	105.2
	Age	26	42	0.3810	0.619	61.9
	Household size	7	8	0.125	0.875	87.5

Source: Field Survey Analysis 2022

Table 4.6 shows the performance of maize value chain relative to baseline in terms of CIG's technology adequacy and demographic variables. The pooled data showed that the technology adequacy in the base year was 47.7% and 58.3% in the current year, this result implies that there

was improvement in the technology adequacy in the study area and what the Programme envisaged is happening technology wise and this needs to be encouraged.

The baseline data showed that female membership/participation was 12% and 30% at the current year. This result shows that there is an improvement in the percentage of female membership. This is in line with the findings of Oladejo *et. al.* (2011) that there is high rate of involvement of women in agricultural production.

The pooled data further showed that Education at the baseline survey was 97.6% and 92.8% at the current year. This result implies that there is a marginal drop in terms of number of participants that have formal education especially in the North (Kaduna & Kano), and this is surprising at this stage when farmers need more formal education to enable them improve on their skills and make better informed decisions. Oladeebo *et. al.* (2013), opined that there was a scope for increase in farmers 'efficiency by improving their level of education.

At the baseline survey, more youths were recorded (26 years) while at the current/study year the recorded participants were older youths/young adults between the ages of 41-45years. This result implies that the youths are shying away or no longer interested in agriculture and this has affected the program as the program is gradually accommodating older adults.

4.5 Performance of Maize Value Chain relative to Baseline Production, Processing and Sales

Table 4.7 shows the performance of maize value chain relative to baseline production, processing and sales

Table 4.7: Performance of Maize Value Chain relative to Baseline Production, Processing and Sales

States	Variables	Base Year (B)	Current Year (C)	(C –B)/C	(1-(C-B)/C)100	Performance Index
Enugu	Output (t)	1195.58	10410.3	0.89	0.114	11.48
	Area (Ha)	7.45	1.89	-2.94	3.94	-394.18
	Yield (t/Ha)	160.48	5508.10	0.97	0.03	2.91
	Processing (N/Ha)	33800	108853.3	0.69	0.31	31.05
	Marketing/Sales	35383	115700.2	0.69	0.31	30.58
Kaduna	Output (t)	1228.00	8627.39	0.86	0.14	14.23
	Area (Ha)	3.39	2.90	-0.17	1.17	-116.90
	Yield (t/Ha)	362.24	2974.96	0.88	0.12	12.18
	Processing (N/Ha)	27500	108442.1	0.75	0.25	25.36
	Marketing/Sales	37502	106826.6	0.65	0.35	35.11
Kano	Output (t)	4055.53	4885.07	0.17	0.83	83.02
	Area (Ha)	5.17	2.75	-0.88	1.88	-188
	Yield (t/Ha)	784.44	1776.39	0.56	0.44	44.16
	Processing (N/Ha)	404905	116948.6	-2.46	3.46	346.22
	Marketing/Sales	197000	95180.79	-1.07	2.07	206.97
Pooled	Output (t)	6479.11	14539.34	0.55	0.45	44.56
	Area (Ha)	16.00	7.54	-1.12	2.12	-212.20
	Yield (t/Ha)	404.94	5174.14	0.92	0.08	7.83
	Processing (N/Ha)	478205	455969.1	-0.05	1.05	104.88
	Marketing/Sales	588332	486939.2	-0.21	1.21	120.82

Source: Field Survey Analysis 2022

The result shows the performance of maize value chain relative to baseline production, processing and sales in the study area. The performance index shows that output in Enugu, Kaduna and Kano were 11.48%, 14.23% and 83.02% respectively. This is an indication that the performance output outran the baseline by 11.48%, 14.23% and 83.02% respectively in Enugu, Kaduna and Kano.

The pooled result showed that the area of land declined over the years by 212.20%. This decline could be attributed to farmlands not being cultivated as a result of the increasing security challenges in the country, invasion of the farmlands by herdsmen and their cattle and other use of land asides maize production.

The pooled result further showed that performance in processing and marketing/sales outran the baseline by 104.88% and 120.82% respectively. This result indicates that Commercial Agriculture Development Project had a positive impact on the performance of maize farmers in the study area. This is consistent with the findings of Bako *et. al.,* (2020) that a positive and significant relationship exists between the participation in CADP program and farmers' income.

4.5.2 Value Added and Net Returns Analysis Based on Gender in Maize Value Chain

This the result of Net Returns analysis and value addition across different nodes based on gender in maize value chain in Nigeria.

4.5.3 Male Producers Costs and Returns Analysis of Maize Production in Nigeria

Table 4.8 shows the pooled result of the male producers cost and return analysis of Maize production in Nigeria

Table 4.8: Result of the male producers' costs and returns analysis of Maize production in Nigeria

	Variables	Description (Mean)	Amount (N/kg) Mean	Value(N/Ha) Mean
A	Cost			
i	Operating Cost			
ii	Planting Material	34.13kg Maize seed @250.0/Kg	8532.5	
iii	Fertilizer	20.54 Kg Fertilizer @3650.20/Kg	74245.07	
iv	Labour	Land Clearing 51350.30		
		Planting 37375.33		
		Weeding/Chem application 49767.88		
		Fertilizer application 23765.21		
		Harvesting 34645.55		
	Total Labour Cost		196904.27	
v	Pesticides and Herbicides	5.53 liters @ N717.58/liter (DD Force)	3969.22	
vi	**Total operating Cost**		**283651.06**	**98832.75**
vii	**Fixed Cost**		**48703.03**	
viii	**Total Cost**		**332350**	**115801.4**
B	**Sales i.** Maize Grains	2288.69kg of maize grains@N196.77/kg	450345.53	
	ii. Maize Cobs	568.4Kg of fresh cobs @N151.20/Kg	85942.08	
	iii. Home consumption	495Kg of Maize grain @ N168.10/kg	83160	
C	**Total Revenue**		**619447.61**	**215835.4**
D	**Net Return**		**286797.61**	**99929.48**

Source: Field Survey Analysis 2022

The average total quantity of maize produced by the male producers in Kano, Kaduna and Enugu state was 2783.69kg and the quantity sold was 2288.69kg. The average total variable cost incurred on maize production in the study area was ₦283,651.06 while the total revenue realized was ₦619,447.61. The net return was ₦286797.61 which indicated that maize production was profitable. This result is in line with the findings of Abdulaleem *et.al.* (2017) that maize production is a profitable farm enterprise.

4.5.4: Female Producers' Costs and Returns Analysis of Maize Production in Nigeria

Table 4.9 shows the pooled result of the female producers cost and return analysis of Maize production in Nigeria

Table 4.9: Result of the female producers' costs and returns analysis of Maize production in Nigeria

	Variables	Description (Mean)	Amount Mean(N/kg)	Value(N/Ha) Mean
A	Cost			
i	Operating Cost			
ii	Planting Material	163.6kg Maize seed @ 204.0/Kg	33374.4	13243.81
iii	Fertilizer	34.54 Kg Fertilizer @3650.20/Kg	199081.9	79000.75
iv	Labour	Land Clearing 58530.30		
		Planting 23577.28		
		Weeding/Chem application 19886.77		
		Fertilizer application 12229.33		
		Harvesting 10440.56		
	Total Labour Cost		124664.24	49469.94
v	Pesticides and Herbicides	9.78 liters @ N883.58/litre	8642.39	3429.52
vi	**Total operating Cost**		**365762.93**	145144
vii	**Fixed Cost**		**62664.87**	24867.01
viii	**Total Cost**		**428427.79**	190011
B	**Sales** **i.** Maize Grains	2403.34kg of maize grains @N201.67/kg	484613.01	192306.8
	ii. Maize Cobs	607.8Kg of fresh cobs @N160.80/Kg	97734.24	38783.43
	iii. Home consumption	598Kg of Maize grain @ N156.80/kg	93288.00	37019.05
C	**Total Revenue**		**675635.25**	268109.2
D	**Net Return**		**247207.46**	78098.2

Source: Field Survey Analysis 2022

The average total quantity of maize produced by the female producers in Kano, Kaduna and Enugu state was 3001.34kg and the quantity sold was 2403.34kg. The average total variable costs incurred on maize production in the study area was ₦283,651.06 while the total revenue realized was ₦675,635.25. The net return was ₦247207.46 which indicated that maize production was profitable. This result is in line with the findings of Abdulaleem *et.al.* (2017) that maize production is a profitable farm enterprise.

4.5.5: Male Processors Costs and Returns Analysis of Maize in Nigeria

Table 4.10 shows the pooled result of the male processors' costs and returns analysis of Maize in Nigeria

Table 4.10: Pooled result of the male processors' costs and returns analysis of Maize in Nigeria

	Variables	Mean Description	Amount (N) Mean	Value(N/Ton) Mean
A	**Processing Cost Items**			
i	Raw material/Intermediate Cost	650.12kg of maize grains@N309.81kg	201415.69	
ii	Transportation	283.76kg of maize grains@N20/kg	30164.15	
iii		267.78 kg of maize flour @ N120/kg	33793.84	
iv	Handling cost	267.78kg of maize flour @ N12.10/kg	3240.14	
v	Processing Cost	283.76kg of maize grains@N150/kg	42564	
	Labour	28 Mandays @ N1127.60/Manday	31572.8	
vi	Loading and off loading		21079.25	
		Total Processing Cost	363829.87	363.82
	Total Processing Operation Cost			
B	**Fixed Cost Items**			
i	**Rent**		**68943.3962**	
ii	**Depreciation**		27778.97	
	Levies		**6684.90566**	
	Total Fixed Cost		**103407.272**	103.41
	Total Processing Cost		467237.142	467.24
C	**Revenue**			
D	**Total Revenue**	**467.03kg of Maize flour @ N1250.60/kg**	**583790.08**	**583.79**
E	**Value added/Kg**		**1246.79**	
G	**Net Return**		**116552.938**	**116.55**

Source: Field Survey Analysis 2022

Table 4.10 shows the cost items that are involved in maize processing and the revenue (income) as well as profit accruable to maize processing among male processors in Kano, Kaduna and Enugu. The result showed that the total revenue accrued was ₦583,790.08 and the net return was ₦116552.938 which indicated that maize processing is a profitable business among men in the study area.

4.5.6: Female Processors' Costs and Returns Analysis of Maize in Nigeria

Table 4.11 shows the pooled result of the female processors' costs and returns analysis of Maize in Nigeria

Table 4.11: Pooled result of the female processors' costs and returns analysis of Maize in Nigeria

	Variables	Description (Mean)	Amount (N) Mean	Value (N/Ton) Mean
A	**Processing Cost**			
i	Raw material/Intermediate Cost	569.48kg of maize grains@N319.89kg	182169.66	
ii	Transportation	253.60kg of maize grains@N20/kg	22625.84	
iii		213.48 kg of maize flour @ N120/kg	25573.2	
iv	Handling cost	213.48kg of maize flour @ N12.10/kg	2578.63	
v	Processing Cost	253.60kg of maize grains@N150/kg	38040	
	Labour	23 Mandays @ N1017.40/Manday	23400.12	
vi	Loading and off loading		18414.61	
	Total Processing Operation Cost		312802.06	**312.80**
B	**Fixed Cost**			
i	Rent		68483.14607	
ii	Depreciation		32642.5618	
	Levies		5975.28	
	Total Fixed Cost		107100.988	**107.10**
	Total Processing Cost		419903.048	**419.90**
C	**Revenue**			
D	**Total Revenue**	424.57kg of Maize flour @ N1213.60/kg	**515255.33**	**515.33**
E	**Value Added/kg**		**893.71**	
F	**Net Return**		**95352.282**	**95.35**

Source: Field Survey Analysis 2022

Table 4.11 shows the cost items that are involved in maize processing and the revenue (income) as well as profit accruable to maize processing among female processors in Kano, Kaduna and Enugu. The result showed that the total revenue was ₦515,255.33 and the net return was ₦95352.282 and this indicates that maize processing is a profitable business among women in the study area.

4.5.7: Male Marketers' Costs and Returns Analysis of Maize in Nigeria

Table 4.12 shows the pooled result of the male marketers' costs and returns analysis of Maize in Nigeria

Table 4.12: Pooled result of the male marketers' costs and returns analysis of Maize in Nigeria

	Variables	Description (Mean)	Amount (N) Mean	Value(N/Ton) Mean
A	**Marketing Cost Items**			
i	Purchases	i. 1003kg of maize grains@ N377.99/kg	378131	
ii		ii. 200kg of maize flours @N1420/kg	284000	
iii	Transportation	i. 2050kg of Maize grains @ N12.80/kg	26240	
iv		ii. 450kg of Mize flour @ N12.57/kg	5656	
v	Storage/Handling	i. 167.38kg of maize flour @ N10.10/kg	1690.53	
		ii. 448.59Kg of Maize grain @N18.70/kg	8388.63	
vi	Loading & offloading	2900.25		
		Total Operating Cost	**707006.41**	707.00
	Fixed Cost Items			
B	Rent		10000	
i	Depreciation		2338.97	
ii	Levies		2239	
	Total Fixed Cost		**14577.97**	**14.58**
C	**Total Marketing Cost**		**721584.38**	**721.58**
D	**Revenue**			
	Sales	i. 200kg of Maize flour @N1467.89/kg	293578	
E		ii. 1003kg of Maize grains @ N607.56/kg	609382.68	
F	**Total Revenue**		**902960.68**	**902.96**
H	**Net Return**		**181376.3**	**181.38**
	Marketing Margin	Maize flour in N/Kg	**47.89**	
		Maize grain in N/Kg	**229.57**	

Source: Field Survey Analysis 2022

The result presents a net return of ₦181376.3 with a marketing margin of ₦47.89/kg for maize flour and ₦229.57/kg for maize grain. This result shows that maize marketing in the study area is profitable. This result is in line with the findings of Abdullahi *et.al.(*2019) that small scale maize marketing is profitable although the full potential of the business was yet to be captured.

4.5.8: Female Marketers' Costs and Returns Analysis of Maize in Nigeria

Table 4.13 shows the pooled result of the female marketers' costs and returns analysis of Maize in Nigeria

Table 4.13: Pooled result of the female marketers' costs and returns analysis of Maize in Nigeria

Female	Variables	Description (Mean)	Amount (N/ton) Mean	Value(N/ton) Mean
A	**Marketing Cost Items**			
i.	Purchases	i. 1433kg of maize grains@ N391.20/kg	506.59	
ii.		ii. 800kg of maize flours @N1425/kg	1140.00	
iii.	Transportation	i. 2887kg of maize grains @ N12.80/kg	3.69	
iv.		ii. 1050kg of maize flour @ N12.57/kg	13.20	
v.	Storage/Handling	i. 607.8kg of maize flour @ N10.10/kg	6.14	
		ii. 1868.55Kg of maize grain @N18.70/kg	34.94	
vi.	Loading and off loading	2.90		
		Total Operating Cost		1707.46
	Fixed Cost Items			
B	Rent		18.00	
i.	Depreciation		2.37	
ii.	Levies		2.23	
	Total Fixed Cost			**22.6**
C	**Total Marketing Cost**			**1684.86**
D	**Revenue**			
	Sales	i. 770kg of Maize flour @N1500.71/kg	1155.55	
E		ii. 1403kg of Maize grains @ N617.64/kg	866.55	
F	**Total Revenue**			**2022.10**
G	**Net Return**			**274.24**
Profitability				
	ROC			**0.1569**
%	**Marketing Margin**	Maize flour in N/Kg		**57.88**
%		Maize grain in N/Kg		**5.32**

Source: Field Survey 2022

Table 4.13 shows that the net return was ₦274.24 with a marketing margin of ₦57.88/kg for maize flour and ₦5.32/kg for maize grain. This result shows that maize marketing in the study area is profitable. This result is in line with the findings of Abdullahi *et.al.*(2019) that small scale maize marketing is profitable and characterized by low gross margins.

4.6 Factors Affecting the production, processing and Sales Performance of Maize Value Chain in Nigeria

The multivariate analysis presented in Table 4.14 is the estimates of effect of some socio-economic and other factors of commodity interest groups on the production, processing and sales performance of maize value chain in Nigeria.

Table 4.14: Multivariate Estimates of CADP Actors' Socio-Economic Factors on the Production, Processing and Sales Performance in Maize Value Chain, Nigeria

	Parameter Estimates					
Variables	**Producers**		**Processors**		**Marketers**	
	Coefficient	**/t-value/**	**Coefficient**	**/t-value/**	**Coefficient**	**/t-value/**
Intercept	-142.749		-2.669684846		0.208***	
(Std. Errors)	(110.41)	-1.29288	(3.688835)	0.72372	0.072396	2.872471
Age	5.266**		0.200157356***		0.000691	
(Std. Errors)	(2.567)	2.051399	(0.07866)	2.544582	0.002135	0.323904
House hold Size	-8.16**		0.494514352**		-0.00228	
(Std. Errors)	(4.02)	-2.03631	(0.247746)	1.99605	0.002725	0.83768
Education	7.299**		-0.307896788		0.002101	
(Std. Errors)	(3.479)	2.09802	(0.170756)	1.80314	0.002832	0.741857
Farming Experience	-0.256		-0.014485774		0.000364	
(Std. Errors)	(1.54)	-0.16629	(0.065715)	0.22043	0.001577	0.230533
Marital status	53.175		-6.3772269***		-0.076***	
(Std. Errors)	(56.81)	0.935959	(1.21761)	5.23749	0.020889	3.65351
Sex	-58.51		1.839481334		-0.046***	2.27004
(Std. Errors)	(45.48)	1.28666	(1.10224)	1.668857	0.020211	
Value added	-5.6E-05		9.82371E-06		2.97E-08**	2.318295
(Std. Errors)	(0.000147)	0.37935	(1.03E-05)	0.954706	1.28E-08	
Amount Disbursed	0.000225***		2.60282E-06**		-1.1E-07**	
(Std. Errors)	(5.64E-05)	3.991814	(1.11E-06)	2.344997	4.75E-08	2.39493
	Functional /Diagnostic Statistics					
R-Square	0.537004		0.437341436		0.444136	
Adjusted R-Square	0.2408764		0.38107558		0.364727	
Standard Error	217.2391		4.69333644		0.075113	
F-Statistics	10.05716***		7.772767787***		5.59301***	
Observations	165		89		65	

Source: Field Survey 2022

The production, processing and sales performance model have F-Statistics of 10.06, 7.77 and 5.59 respectively, which is greater than the tabulated value at $p<0.05$ critical level. This shows that the three models have good fits and the included explanatory variables of each of the models actually accounted for the variations in the dependent variable, which are the production, processing and sales performance in maize value chain in Nigeria.

It can be seen from the result that the amount disbursed were not mutually exclusive and it is statistically significant across the production, processing and sales performances in the area. While the estimates showed a positive effect on production and processing performance, there is a negative but significant relation with sales performance. There is a marginal increase of 0.0002 and 2.60 $X10^{-6}$ units of production and processing performance respectively, but shows a marginal decrease of 1.10 X 10^{-7} with the sales performance in the area. Hence, as the amount of capital disbursed increases, there is a significant increase in production and processing performance of maize while a decrease in sales performance is recorded in the study. The decreasing marketing performance of maize with the increase in amount disbursed suggests that there is an issue with logistics and distribution of maize around the country. The hike in cost of performing marketing services is seriously fingered in declining gross and marketing margin as Rust, Mooreman and Dickson (2002) observed that cost reduction perspective is quick approach to capital expansion in agribusiness. Transportation of perishable (agricultural) products especially in the distribution of maize and its products around the country last for several days on the road due to bad and poor road network around the country. Hence, the unit price of these products continued to increase unabatedly because of the increasing marketing cost incured.

Again, the actors' age which is also statistically significant at $p<0.05$ critical level with production and processing performance indicated a positive effect at 5.27 and 0.20 units respectively. Production and processing performances, which is not better with young actors in the chain, may affect continuity of the activities along the chain in the long run. The younger interest group whose performance is not encouraging could be due to lack of interest in production and processing. Their decline in performance may continue if their skills are not improved by making production and processing an interesting activity in the chain.

In the same way, the house hold size, which shows a negative but significant effect of 8.16 units with production performance, has a positive and significant effect of 0.49 units with processing performance in the area. This is because the more the household size, there is more labour for processing but it forces down the performance of production probably due to the cost implication of the interaction of increased labour with other inputs does not increase the production performance in the area. This contrast with education, with a positive and significant effect of 7.299 units with production and does not show any significant effect with processing and sales performances of maize in the area. Education significantly increases the technicalities and skill of the interest groups just as household size reduces it.

Marital status which is statistically significant ($p<0.05$) but has negative effect of 6.38 and 0.076 units respectively, with processing and sales performance is not significant with production performance even at $p<0.1$ critical level. Marriage responsibility reduces both sales and processing performance because of the divided attention these activities in the chain gets from the actors and this contrast with the findings of Rayasawath (2018) that marital responsibility could have an increased effect in performance of processing agricultural products. This is

because of the ability to cope with new succession in agricultural work provided by family labour.

It could be seen from the result that value added to maize products can significantly enhance sales performance by 2.98 X 10^{-08} than both production and processing performances in the area. This implies that value addition to maize has a better attribute to maize marketing in the area than any other activities in maize value chain. Value addition is important in increasing satisfaction derived per unit quantity of maize sold in the area. This is consistent with Ehirim et al., (2019) who observed that with increased consumer satisfaction; marketing efficiency is achieved as sale performance stimulates further production. When consumers get more value for maize products bought in the market, sale increases and more maize is bought from the farmers thus increasing further production as farmers are sure of getting more value of their products as they go into further production.

4.7 Institutional and Socioeconomic Factors that affect the availability of matching grant to Commodity Interest Groups (CIGs) in Maize Value Chain

Table 4.15 shows the institutional and socioeconomic factors that affect the availability of matching grant to commodity interest groups (CIG) in maize value chain

Table 4.15: Institutional and Socioeconomic Factors that affect the availability of matching grant to Commodity Interest Groups (CIGs) in Maize Value Chain

Variables	Availability of funds		Obey sharing formula		Group Embezzlement	
	Parameter Estimates/Probabilities					
	Coeff	/t- val/	Coeff	t- val	Coeff	t- val
World bank delay	-0.879	-0.511	0.3250**	2.259	.175	0.141
	(1.720)		(0.1439)		(1.240)	
National delay	0.685	0.435	-0.2866**	-2.304	.176	0.143
	(1.572)		(.1244)		(1.228)	
State delay	-0.954	-1.273	-0.0864	-.806	-.271	-0.579
	(0.750)		(1.071)		(.468)	
Sex	-0.727	-1.766	-.609	-.802	2.162	1.903
	(0.978)		(.760)		(1.136)	
Gratification	-1.194	-1.868	.018	.026	-.109	-0.243
	(0.639)		(.664)		(.450)	
Education	-0.102	-0.933	.163	1.543	-.107	-1.744
	(0.109)		(.106)		(.061)	
Experience	-0.099**	-2.069	.001	.011	-.006	-0.142
	(0.048)		(.084)		(.044)	
Net income	0.0001	0.585	0.0001**	1.978	.000	0.890
	(0.0001)		(.0001)		(.000)	
Age	-0.001	-0.033	-.031	-0.416	.006	0.146
	(0.045)		(.075)		(.043)	
Household size	0.308***	2.403	.104	0.871	-.071	-1.264
	(.128)		(.119)		(.056)	
	Functional Parameters					
Chi Square	40.265***		166.42***		76.05***	
No. of observations	247		247		247	

Source: Field Survey 2022

The result shows a Chi square value of 40.265, 166.42 and 76.05 for availability of funds, obeying sharing formula and group embezzlement respectively. These values are significantly different from their tabulated values of 16.09 at P≤ 0.01 critical level. This implies that the three models have good fit and their included explanatory variables, which include the institutional

and socioeconomic factors, can explain the probability of fund availability to meet the matching grants by the different commodity interest groups in maize value chain in Nigeria.

The result shows that World Bank delay is significant and positive which implies farmers can use the delay to provide their matching grants. The National delay is significant and negative implying such delay at the National level increases the probability of defaulting in the sharing formula and vice versa. At any slight delay, the farmers may divert their funds to other income generating activities, hence defaulting in providing their matching grants. Encouraging any gap in the sharing formula may have a serious ripple effect in maize production as farming activities in the area is time specific.

The result also showed that the net farm income of the farmers is significant and positive, hence increase in their farm income will make them comply with the sharing formula and provide their matching grant as soon as there is need for it in maize value chain activities. It could also be deduced from the result that high farm income increases the probability of fund availability. Hence at high income funds are made available for matching grant and continuity of the programme. This is in line with the finding of Christopher et.*al.*, (2017) that CADP impacted the lives of commercial farmers by raising their income level and subsequently leading to the empowerment of farmers through the provision of matching grant. There is no significant result with the fund embezzlement in the area.

It can be deduced from the result that probability of availability of funds increases the matching grants of commodity interest group in maize value chain if their household size (0.308) increases but decreases with years of farming experience (0.099).household size though not significant even at $P \leq 0.1$ *critical level* increases the matching grant when the commodity interest group

obeys the matching grant. The result also shows that embezzlement of funds reduces matching grant with a unit increase in household size as the sign is negative though not significant. This implies that household size offers the group enough cheap labour to raise more farm income for the farming households. It can be deduced from this finding that when fund is made available from the added income generated by increased labour employment in the farm, matching grants can be provided with ease. Appiah-Twumasi, Donkoh, Ansah, (2022) noted that most developing economies in Sub-Saharan Africa are sustained by agricultural income from increased labour employment in farm production. It could be deduced from the result that while increase in household size increases the probability of obeying the sharing formula, it reduces the probability of fund embezzlement as commodity interest group generate more funds to meet their matching grant.

4.8 FACTORS CONSTRAINING THE IMPLEMENTATION OF CADP ALONG MAIZE VALUE CHAIN

Table 4.16 shows the factors constraining the implementation of CADP along maize value chain

Table 4.16: Factors Constraining the Implementation of CADP along Maize Value Chain (Correlation Matrix)

	Component					
	1	2	3	4	5	6
Delay in fund disbursement	-0.756		-0.242	0.142		
Lack of access to credit sources	0.748		0.164	-0.089		0.207
Lack of training	0.635	0.064	-0.183	-0.154	-0.304	
Funds are not readily available when needed	-0.593	0.432	-0.295	-0.089	0.241	0.062
Other socio-economic factors	0.575	-0.094	-0.453		0.317	0.132
Management asks for gratification before approving funds	0.510	0.463		0.248	-0.271	0.162
Insufficient access to fair market price information	-0.155	0.748	0.097	0.173	-0.350	0.158
High cost of inputs	0.051	0.700	0.339	0.084		-0.073
Inability to provide percentage requirement for the fund		-0.591	0.486	0.332	-0.141	0.084
Land tenure problem		0.148	0.602		0.545	-0.051
Funding do not obey sharing formula	0.261	-0.059	-0.259	0.669	0.233	0.167
Embezzlement of group funds by group officers	0.171	0.230	-0.074	0.303	0.505	
Group not financially buoyant to finance counterpart contributions	-0.051		0.086	-0.517	0.171	0.729
Poor infrastructure (roads, irrigation, poor harvest facilities)	-0.399	-0.207	0.062	0.337	-0.183	0.555

Source: Field Survey 2022

Table 4.17: Extraction Method: Principal Component Analysis.

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.764	19.740	19.740	2.764	19.740	19.740	2.618	18.697	18.697
2	1.937	13.832	33.572	1.937	13.832	33.572	1.707	12.192	30.889
3	1.219	8.707	42.279	1.219	8.707	42.279	1.371	9.793	40.682
4	1.190	8.500	50.779	1.190	8.500	50.779	1.300	9.285	49.966
5	1.138	8.131	58.910	1.138	8.131	58.910	1.199	8.567	58.533
6	1.001	7.146	66.056	1.001	7.146	66.056	1.053	7.524	66.056
7	0.896	6.398	72.455						
8	0.842	6.015	78.470						
9	0.662	4.726	83.196						
10	0.646	4.611	87.807						
11	0.558	3.987	91.793						
12	0.444	3.172	94.965						
13	0.372	2.654	97.619						
14	0.333	2.381	100.000						

Extraction Method: Principal Component Analysis.

Source: Field Survey 2022

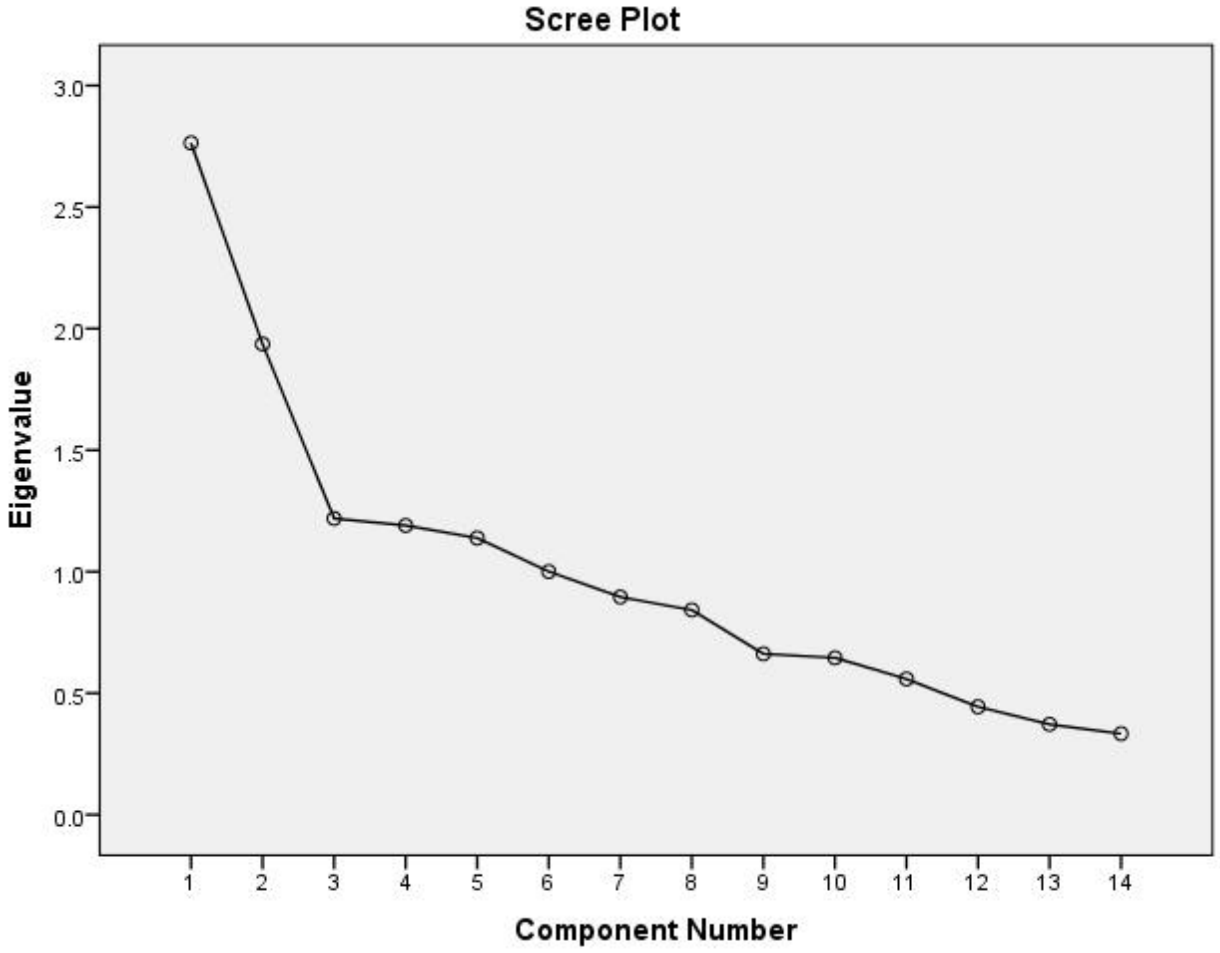

Figure 4.2 Chart showing the Scee Plot

Source: Field Survey 2022

The Principal Component Analysis (PCA) extracted 6 major factors constraining the implementation of CADP in the value chain namely: delay in fund disbursement, insufficient access to fair market price information, inability to provide percentage requirement for the fund, funding do not obey the sharing, land tenure problem and poor infrastructure (roads, irrigation, poor harvest facilities). The more delay there is in fund disbursement, the lower the outcome of

the results that will be achieved from the programme as this will negatively affect the productivity of the farmers.

Insufficient access to fair market information among maize value chain actors in the study area negatively affected the output of the programme. According to Mawazo et. al., (2014) use of accurate and timely agricultural market information enhances market performance which is beneficial in improving the knowledge of market actors.

Land tenure problems had a negative effect on the productivity of the farmers which also affected the results achieved by the programme. This is because many maize farmers in the study area worked on land they did not own, or on communal lands thereby limiting their access to adequate farm land for farming activities. This is in line with the findings of Eze et.al., (2011) that tenure system showed a negative relationship with productivity and as land tenure system decreases, farmer's productivity also decreases and vice versa.

The study further identified poor infrastructure (roads, irrigation, poor harvest facilities) as a major constraint encountered by the maize farmers in the study area. Poor infrastructure negatively affects input and output prices as well as transaction costs farmers encountered which in turn affects the results of the programme. This is in line with the findings Ofana, Efefiom and Omini (2016) that the smallholder farmers are constrained by many problems including those of poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land and environmental degradation, inadequate research and extension services, etc. Asante et al., (2016) also pointed out that factors such as poor infrastructure influence commercialization by affecting conditions of commodity demand and supply, input and output prices, and the transaction costs faced by farmers, traders, and other members in the food marketing channels.

4.9 Hypotheses Testing

Hypotheses that the socioeconomic factors of commodity interest groups do not significantly influence the production, processing and sales performance of maize value chain and the hypothesis that institutional and socioeconomic factors cannot significantly explain the probability of fund availability in meeting the matching grants by the different commodity interest groups in maize value chain in Nigeria were both tested and presented in Table 4.18

4.10 Test of Hypothesis

The result of hypotheses tested in this study is presented in Table 4.18 below. The Socioeconomic factors of commodity interest groups do not significantly influence production, processing and sales performance of maize value chain in Nigeria as shown in the first hypothesis tested below

Table 4.18: Hypotheses Results

Hypothesis 1: F-Statistics of ANOVA Estimate in Multivariate Regression Result

Hypothesis 1	Actors/ Node	F-Statistics		Decision
		Tabulated	Calculated	
While amount disbursed and education are significant and positively related to output performance, household size has an inverse influence	Production	2.639	10.057***	Null hypothesis rejected and the alternative hypothesis accepted
Amount disbursed, age and household size are positive and significantly affecting performance of processor and marital status do not	Processing	2.639	7.773***	Null hypothesis rejected and the alternative hypothesis accepted
Amount disbursed, value added, sex and marital status are significant and negatively affecting sales performance in the area	Sales	2.639	5.593***	Null hypothesis rejected and the alternative hypothesis accepted

@ p<0.01 critical level

Hypothesis 2: Chi ($\ddot{X}^2$) Estimates of the Probit Multivariate Result

Hypothesis 2	Actors/ Node	Chi ($\ddot{X}^2$) Square values		Decision
		Tabulated	Calculated	
The institutional and socioeconomic factors cannot significantly explain the probability of fund availability in meeting the matching grants by the different commodity interest groups in maize value chain in Nigeria.	Production	70.062	40.265	Null hypothesis accepted and the alternative hypothesis rejected
	Processing	93.934	166.42***	Null hypothesis rejected and the alternative hypothesis accepted
	Sales	61.754	76.05***	Null hypothesis rejected and the alternative hypothesis accepted

@ p<0.01 critical level

Source: Survey Result Analysis 2022

The result revealed that the tabulated F-statistics is less than the calculated F-statistics at p<0.01 critical level. The null hypothesis that the included socioeconomic factors of commodity interest groups do not significantly influence on production, processing and sales performance of maize value chain in Nigeria is rejected and the alternative hypothesis that the included socioeconomic

factors of commodity interest groups have significant influence on production, processing and sales performance of maize value chain in Nigeria is thus accepted in this study.

The absolute t-values as shown in Table 4.14 shows that the amount of money disbursed to farmers and education are both significant $P < 0.05$ critical level and positively related to output performance, but the household size though statistically significant at P , 0.05 crital level has an inverse influence on production performance of the farmers in the area. Hence the null hypotheses are rejected for these variables while the alternative hypothesis accepted. Other included explanatory variable that were not statistically significant even at $P < 0.10$ critical level such as farming experience, sex, marital status and value added had their null hypothesis accepted in this study. For the processors, the null hypothesis that socio-economic characteristic of the processors such as amount of capital disbursed, age and household size on performance level of the processors of maize, which are statistically significant at $P < 0.05$ critical level but positive and marital status negative though significant also were rejected and their alternative hypothesis accepted at that level. The sales performance of the respondent also shows that the amount of capital disbursed, value added to maize products sold, sex and marital status are statistically significant at $P < 0.05$ critical level but negatively affecting sales performance of the traders of maize in the area. The null hypotheses were all rejected and the alternative were accepted at that same critical level.

In the same manner the tabulated Chi ($\ddot{X}^2$) square value of 70.062 is greater than the calculated value of 40.265, hence the second null hypothesis that the institutional and socioeconomic factors cannot significantly explain the probability of fund availability in meeting the matching grants by the different commodity interest groups in maize value chain in Nigeria was accepted

and the alternative hypothesis rejected in the study. It therefore means that the institutional and socioeconomic factors can significantly explain the probability of fund availability in meeting the matching grants by the different commodity interest groups in maize value chain in Nigeria. However, the Chi ($\ddot{X}^2$) square value of 93.934 of the processing group is less than the calculated value of 166.42 as shown in the table. Again the tabulated value of 61.754 is lower than the calculated value of 76.05 hence, the institutional and socioeconomic factors significantly explained the probability of fund availability in meeting the matching grants by the processors and marketer of maize in the area.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The broad objective of this study was to assess the Commercial Agriculture Development Projects (CADP) for maize value chain in Nigeria. The specific objectives were to identify the commodity interest groups (CIGs), their roles and operations in maize value chain in the study are; describe the socioeconomic characteristics of the interest groups in the targeted value chain; assess the level of gender involvement and segmentation supported by the project in the targeted value chain; assess the performance of CADP relative to baseline in terms of CIGs' technology adequacy and demographic variables; assess the performance of maize value chain relative to baseline production, processing and sales; estimate the socioeconomic factors of the commodity interest groups that influence the production, processing and sales performance of the targeted value chain; estimate the institutional and socioeconomic factors that affect the availability of CADP's matching grant to commodity interest group in maize value chain, and examine the factors constraining the implementation of CADP along maize value chain in the study area. The null hypotheses tested were that the socioeconomic factors of commodity interest groups do not significantly influence the production, processing and sales performance of maize value chain in the area; and the institutional and socioeconomic factors do not significantly affect the availability of CADP's matching grant to Commodity Interest Groups (CIGs) in Maize Value Chain. A multi-stage sampling technique was employed in the selection of sample. A total sample of three hundred and sixty (360) different maize value chain actors as respondents, were drawn into the sample. The respondents were administered with a well structure and open ended

questionnaire to elicit different information on their socioeconomic, instruction based activities, quantity of input and output used in their production, processing and marketing activities and challenges etc. The study found only 319 of the total responses valid and used for the data analyses.

Data collected for this study were analyzed using descriptive statistics, functional analytical tool, Duncan Dissimilarity Index (DDI), performance index, multivariate regression technique, multivariate probit model and principal component analysis. The pooled result showed that the average total amount of capital required by the male and female maize producers was ₦526,013.3 and ₦506091 respectively while ₦434.367.5 and ₦487090.5 were the amount of capital obtained for their farming activities. This showed there was a 17% inadequacy in funding for the male producers and 3.8% for their female counterparts. The pooled result further showed that the amount of capital required by the male and female maize processors was ₦700000 and ₦912735.9 respectively and the amount obtained for the male and female processors were ₦657, 477.329 and ₦807, 832.121. The male and female processors experienced a 0.17% and 0.13% inadequacy in funding. The male and female maize marketers required an average amount of ₦407400 and ₦785000 for their business but obtained ₦352536.8 and ₦722199.9 respectively. The capital inadequacy was 0.13% for the male marketers and 0.08% for the female marketers. The result revealed that the male producers had the highest percentage (17%) of capital inadequacy which invariably affected the rate of returns. All the actors across the state had the final products of maize grains, corn paste and corn flour. The producers across the three states namely Kano, Kaduna and Enugu state had maize grains as their final product, majority of the processors had corn flour as their final product while the marketers had maize grains and corn flour as their final product. The pooled result further showed that 86.47% of the male producers

and 56.25% of the female producers complained about delay in fund disbursement, 49.1% of the male processors and 100% of the female processors also complained about delay in fund disbursement and 96% of the male marketers and 100% of the female marketers agreed that there was delay in fund disbursement. Enugu male and female producers had the highest total cost of production of ₦140098.6 and ₦122367.3 while Kaduna male and female producers had the lowest total cost of production of ₦53554.2 and ₦91445.8 respectively.

The average total quantity of maize produced by the male producers in Kano, Kaduna and Enugu state was 2783.69kg and the quantity sold was 2288.69kg. The average total variable costs incurred on maize production in the study area by the male producers was ₦283651.06 while the total revenue realized was ₦619447.61. The average total variable costs incurred on maize production in the study area was ₦283651.06 while the total revenue realized was ₦675635.25.

The total revenue accrued by maize processors in Kano, Kaduna and Enugu was ₦583790.08 and the gross margin was ₦241.04/ton. The return to capital was 0.249, indicating that for every one naira invested by the male processors, a return of ₦0.249 was realized and this indicates that maize processing is a profitable business among men in the study area.

The gross margin for male marketers in Kano, Kaduna and Enugu was ₦801.52/ton with a marketing margin of ₦47.89/kg for maize flour and ₦229.57/kg for maize grain while gross margin was ₦299.54/ton with a marketing margin of ₦57.88/kg for maize flour and ₦5.32/kg for maize grain for the female marketers. The capital turnover value was ₦15.69 and it indicated that for every one naira invested in maize marketing by the female marketers in the study area, ₦15.69 was realized. This result shows that maize marketing in the study area is profitable.

The result further showed that a large proportion of the respondents were within the age range of 35- 44 years and were still physically active, had 11-20 years farming experience and majority of the respondents were married and had secondary school education. The pooled result of the level of dissimilarity index showed that the female actors in the study area dominated in the area of capital disbursed and output. This means that 1.21% of capital disbursed and 1.872% of output favored the females than their male counterparts. The result further showed that 0.35% of inadequate capital procurement were from the male actors than their female counterparts. This result means that the female actors are more capital adequate and this could be because the females are making more effort in adding capital from external sources which positively affects their output(productivity). The performance of maize value chain relative to baseline in terms of CIG's technology adequacy and demographic variables showed that the technology adequacy in the base year was 47.7% and 58.3% in the current year, this result showed that there was improvement in the technology adequacy in the study area and what the programme envisaged is happening technology wise and this needs to be encouraged.

The pooled data further showed that education at the baseline survey was 97.6% and 92.8% at the current year. This result indicated that there was a marginal drop in terms of number of participants that have formal education especially in the North (Kaduna & Kano), and this was surprising at this stage when farmers need more formal education to enable them improve on their skills and make better informed decisions. At the baseline survey, more youths were recorded (26 years) while at the current/study year the recorded participants were older youths/young adults between the ages of 41-45years. This result indicated that the youths were shying away or no longer interested in agriculture and this had affected the program as the program was gradually accommodating older adults.

The percentage speed of time/ average speed of performance shows that output in Enugu, Kaduna and Kano was 11.48%, 14.23% and 83.02% respectively. This indicated that the performance output outran the baseline by 11.48%, 14.23% and 83.02% respectively in Enugu, Kaduna and Kano. The pooled result showed that the area of land declined over the years by 212.20%. This decline could be attributed to farmlands not being cultivated as a result of the increasing security challenges in the country, invasion of the farmlands by herdsmen and their cattle and other use of land asides maize production. The pooled result further showed that performance in processing and marketing/sales outran the baseline by 104.88% and 120.82% respectively. This result indicated that Commercial Agriculture Development Project had a positive impact on the performance of maize farmers in the study area.

The production, processing and sales performance model have F-Statistics of 10.06, 7.77 and 5.59 respectively, which is greater than the tabulated value at $p<0.05$ critical level. This shows that the three models have good fits and the included explanatory variables of each of the models actually accounted for the variations in the dependent variable, which are the production, processing and sales performance in maize value chain in Nigeria.

The result further showed that the amount disbursed were not mutually exclusive and it is statistically significant across the production, processing and sales performances in the area. Transportation of perishable (agricultural) products especially in the distribution of maize and its products around the country last for several days on the road due to bad and poor road network around the country. Hence, the unit price of these products continued to increase unabatedly because of the increasing marketing cost incured.

Production and processing performances, which is not better with young actors in the chain, may affect continuity of the activities along the chain in the long run. The younger interest group whose performance is not encouraging could be due to lack of interest in production and processing. Their decline in performance may continue if their skills are not improved by making production and processing an interesting activity in the chain.

It can be deduced from the result that probability of availability of funds increases the matching grants of commodity interest group in maize value chain if their household size (0.308) increases but decreases with years of farming experience (0.099).household size though not significant even at $P \leq 0.1$ *critical level* increases the matching grant when the commodity interest group obeys the matching grant. The result also shows that embezzlement of funds reduces matching grant with a unit increase in household size as the sign is negative though not significant. This implies that household size offers the group enough cheap labour to raise more farm income for the farming households. It can be deduced from this finding that when fund is made available from the added income generated by increased labour employment in the farm, matching grants can be provided with ease. Appiah-Twumasi, Donkoh, Ansah, (2022) noted that most developing economies in Sub-Saharan Africa are sustained by agricultural income from increased labour employment in farm production. It could be deduced from the result that while increase in household size increases the probability of obeying the sharing formula, it reduces the probability of fund embezzlement as commodity interest group generate more funds to meet their matching grant.

The result also shows that increased farming experience increases the probability of obeying the sharing formula hence matching grant in the study area. This is so because experience has shown

the farmers the importance of early generation of matching grant. Experienced farmers tend to obey the sharing formula and reduce embezzlement just to make their matching grant available for the continuity of the programme.

The Principal Component Analysis (PCA) extracted 6 major factors constraining the implementation of CADP in the value chain namely: delay in fund disbursement, insufficient access to fair market price information, inability to provide percentage requirement for the fund, funding do not obey the sharing, land tenure problem and poor infrastructure (roads, irrigation, poor harvest facilities).

5.2 Conclusion

The study concluded that the performance in processing and marketing/sales outran the baseline which showed that Commercial Agriculture Development Project had a positive impact on the performance of maize farmers in the study area. It was concluded also that there was delay in fund disbursement and where delay was high, the inadequacy of capital was also high. The study also concluded that the male farmers were more involved in the Programme than their female counterparts though the female farmers were more capital adequate.

The study concluded that processing had the lowest rate of return, the cost of processing was very high compared to cost of production or marketing. The study also concluded that increased farming experience increases the probability of obeying the sharing formula hence matching grant in the study area. This is so because experience has shown the farmers the importance of early generation of matching grant. Experienced farmers tend to obey the sharing formula and

reduce embezzlement just to make their matching grant available for the continuity of the programme.

5.3 Recommendations

1. The number of female farmers in similar future projects should be increased by the stakeholders: World bank, State governments and Federal Ministry of Agriculture etc. More female farmers should also be empowered financially by development finance institutions as the study showed they were more productive.
2. Future Programmes should provide small and micro processing unit to increase rate of return and reduce the cost of processing.
3. Continual investment in similar Programmes by the Federal and State government in collaboration with the World bank is recommended to impact farmers' productivity and income positively.
4. The stakeholders of the Programme are advised to minimize the administrative bottlenecks to ensure timely disbursement of funds and motivate the maize farmers.
5. Maize farmers should form cooperatives and pool their resources together for increased productivity and income.
6. The programme should target experienced farmers and use them to target younger farmers for continual investment in similar programmes.
7. The Federal and State government should improve the infrastructural facilities especially the road networks to serve as an incentive to rural farmers to work harder to increase productivity, subsequently increasing income and reducing the length of time products take to get to the final consumers thereby reducing spoilage as well as wastage.

5.4 Contribution to Knowledge

The study's main contribution is using the Duncan dissimilarity index to show the level of gender involvement and segmentation supported by the project in the targeted value chain. Even though there were more males in the programme than females, the female actors were more capital adequate than their male counterparts. This is significant as it will help to address gender inequalities and promote inclusivity in agricultural value chains which is an important goal for sustainable development.

The study was able to highlight the institutional and socioeconomic factors that affect the availability of matching grant which is a major information gap and was able to establish that increase in the farmer's income will make them comply with the sharing formula and provide their matching grant as soon as there is need for it in maize value chain activities.

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APPENDIX I

Result output for producers

1. Age (Pooled) Age Kano Kaduna Enugu

Age	Freq	Rel. Freq		Freq	%	Freq	%	Frequency	%
25 – 35	39	23.6		15	30	18	26.86567	8	16.66667
36 – 45	77	46.7		22	44	33	49.25373	21	43.75
45 – 55	38	23		9	18	15	22.38806	14	29.16667
56 – 65	11	6.7		4	8	1	1.492537	5	10.41667
Total	165	100		50	100	67	100	48	100
Mean	41						41	45	

Education Pooled Kano Education Kaduna Enugu

Education	Freq	Rel. Freq	Freq	%	Freq	%	Frequency	%
None	11	6.7	2	4	6	8.955224	2	4.166667
Primary	18	10.9	6	12	5	7.462687	7	14.58333
Secondary	60	34.3	25	50	11	16.41791	24	50
Tertiary	76	46.1	17	34	45	67.16418	15	31.25
Total	165	100	50	100	67	100	48	100

Marital Status (POOLED) kano Kaduna Enugu

Marital Status	Freq	Rel. Freq	Freq	%	Freq	%	Frequency	%
Married	152	92.1	47	94	66	98.50746	40	83.3
Single	9	5.5	2	4	0	0	6	12.5
Widowed	4	2.4	1	2	1	1.492537	2	4.2
Total	165	100	50	100	67	100	48	100

Household sizePooled Kano Kaduna

Household size	Freq	Rel. Freq	Freq	%	Freq	%	Frequency	%
1 - 5	51	31	14	28	17	25.37313	20	41.7
6 – 10	72	43.5	21	42	28	41.79104	23	47.9
11 – 15	31	18.8	13	26	15	22.38806	3	6.3
> 15	11	6.7	2	4	7	10.44776	2	4.2
Total	165	100	50	100	67	100	48	100
Mean	9		9				6	

Experience pooled			Kano		Kaduna			
Experience	Freq	Rel. Freq	Freq	%	Freq	%	Frequency	%
4 - 10	42	25.4	9	18	21	31.3	12	25
11 - 20	65	39.5	26	52	23	34.3	23	47.91667
21 - 30	39	23.6	11	22	15	22.4	10	20.83333
31 – 40	16	9.7	3	6	6	9.0	3	6.25
> 40	3	1.8	1	2	2	3.0	0	0
Total	165	100	50	100	67	100	48	100
Mean	19		18		18		22	

Major Occupation Pooled			Kano		Kaduna			
Major Occupation	Freq	%	Freq	%	Freq	%	Frequency	%
Artisan	3	1.8	1	2	2	3.0	1	2.083333
Business	7	4.2	0	0	4	6.0	3	6.25
Civil Service	12	7.3	1	2	7	10.4	4	8.333333
Farming	143	86.7	48	96	54	80.6	40	83.33333
Total	165	100	50	100	67	100	48	100

Sex	Pooled		Kano		Kaduna			
Sex	Freq	%	Freq	%	Freq	%	Frequency	%
Female	33	20	3	6	6	9.0	23	47.91667
Male	132	80	47	94	61	91.0	25	52.08333
Total	165	100	50	100	67	100	0	0
							48	100

Farm size								
Farm Size	Freq	%	Freq	%	Freq	%	Frequency	%
0 - 0.9	22	13.3	4	8	15	22.38806	26	54.16667
1.0 - 1.9	36	21.8	12	24	11	16.41791	5	10.41667
2.0 - 2.9	36	21.8	15	30	10	14.92537	3	6.25
3.0 - 3.9	28	17.0	9	18	8	11.9403	2	4.166667
4.0 - 4.9	18	10.9	4	8	8	11.9403	8	16.66667
> 5	25	15.2	6	12	15	22.38806	4	8.333333
Total	165	100.0	50	100	67		48	100
Mean	2.81Ha		2.75		2.9		1.89	

Result output for processors

Age pooled			Kano		Kaduna		Enugu	
Age	Frequency	%	Freq	%	Freq	%	Freq	%
25 – 35	12	13.48315	4	13.33333	2	6.25	6	22.22222
35 – 45	39	43.82022	14	46.66667	13	40.625	12	44.44444
46 – 55	24	26.96629	9	30	7	21.875	8	29.62963
56 – 65	14	15.73034	3	10	10	31.25	1	3.703704
Total	89	100	30	100	32	100	27	100
Mean	45 years		44		48			42

Processors Pooled			Kano		Kaduna		Enugu	
Education	Frequency	%	Freq	%	Freq	%	Freq	%
None	1	1.1	0	0	0	0	0	0
Primary	15	16.9	7	23.33333	3	9.375	5	18.51852
Secondary	43	48.4	16	53.33333	16	50	11	40.74074
Tertiary	21	23.6	7	23.33333	13	40.625	11	40.74074
Total	89	100	30	100	32	100	27	100

Marital Status	Freq	%	Freq	%	Freq	%	Freq	%
Married	77	86.5	26	86.66667	31	96.875	20	74.07407
Single	10	11.2	3	10	0	0	7	25.92593
Widowed	2	2.3	1	3.333333	1	3.125	0	0
Total	89	100	30	100	32	100	27	100

Household pooled			Kano		Kaduna		Enugu	
Household Size	Freq	%	Freq	%	Freq	%	Freq	%
1 – 5	29	32.6	11	36.66667	10	31.25	8	29.62963
6 – 10	57	64.0	18	60	21	65.625	17	62.96296
11 – 15	3	3.4	1	3.333333	1	3.125	2	7.407407
>15	0	0	0	0	0	0	0	0
Total	89	100	30	100	32	100	27	100
Mean	7		7		6		6	

Farm Exp pooled			Kano		Kaduna		Enugu	
Farming Experience	Frequency	%	Freq	%	Freq	%	Freq	%
4 – 10	28	31.5	6	20	7	25.92593		
11 – 20	32	36.0	10	33.33333	12	44.44444		

21 – 30	20	22.4	10	33.33333	7	25.92593
31 – 40	8	9	4	13.33333	1	3.703704
➢ 41	1	1.1	0	0	0	0
Total	89	100	30	100	27	100
Mean	18			20.1	18.5	

Major Occpooled			Kano		Kaduna		Enugu	
Major Occupation	Freq	%	Freq	%	Freq	%	Freq	%
Artisan	2	2.2	3	10	2	6.25	0	0
Business	16	18.0	4	13.3	7	21.875	5	18.51852
Civil Service	0	0	1	3.3	0	0	0	0
Farming	71	79.8	22	73.3	23	71.875	22	81.48148
Total	89	100	30	100	32	100	27	100

Sex	Freq	%	Freq	%	Freq	%	Freq	%
Female	36	40.4	12	40	11	34.375	13	48.14815
Male	53	59.6	18	60	21	65.625	14	51.85185
Total	89	100	30		32	100	27	100

Result output for Traders

Traders' pooled result			Kano		Kaduna		Enugu	
Age	Freq	%	Freq	%	Freq	%	Freq	%
25 - 35	18	27.69231	8	33.33333	5	27.77778	5	21.73913
35 - 45	34	52.30769	10	41.66667	10	55.55556	14	60.86957
46 - 55	12	18.46154	6	25	2	11.11111	4	17.3913
56 - 65	1	1.538462	0	0	1	5.555556	0	0
Total	65	100	24	100	18	100	23	100
Mean	41		44		41		41	

Traders' pooled result			Kano		Kaduna		Enugu	
Education	Freq	%	Freq	%	Freq	%	Freq	%
None	0	0	0	0	0	0	3	13.04348
Primary	13	20	5	20.83333	3	16.66667	2	8.695652
Secondary	31	47.69231	12	50	7	38.88889	12	52.17391
Tertiary	21	32.30769	7	29.16667	8	44.44444	6	26.08696
Total	65	100	24	100	18	100	23	100

41 41

Traders' pooled result			Kano		Kaduna		Enugu	
Marital Status	Freq	%	Freq	%	Freq	%	Freq	%
Married	44	67.69231	17	70.83333	14	77.77778	12	52.17391
Single	19	29.23077	7	29.16667	4	22.22222	8	34.78261
Widow	2	3.076923	0	0	0	0	3	13.04348
Total	65	100	24	100	18	100	23	100

Traders' pooled result			Kano		Kaduna		Enugu	
Household size	Freq	%	Freq	%	Freq	%	Freq	%
1 – 5	27	41.53846	12	50	9	50	6	26.08696
6 – 10	29	44.61538	10	41.66667	6	33.33333	14	60.86957
11 – 15	6	9.230769	1	4.166667	2	11.11111	3	13.04348
>15	3	4.615385	1	4.166667	1	5.555556	0	0
Total	65	100	24	100	18	100	23	100
Mean		8		7		9		8

Traders of pooled result			Kano		Kaduna		Enugu	
Farming Experience	Freq	%	Freq	%	Freq	%	Freq	%
4 – 10	14	21.53846	0	0	5	27.77778	4	17.3913
11 – 20	25	38.46154	13	54.16667	5	27.77778	10	43.47826
21 – 30	24	36.92308	7	29.16667	5	27.77778	7	30.43478
31 – 40	1	1.538462	4	16.66667	2	11.11111	2	8.695652
41	1	1.538462	0	0	1	5.555556	0	0
Total	65	100	24	100	18	100	23	100
Mean		20		21		19		19

Traders' pooled result			Kano		Kaduna		Enugu	
Major Occupation	Freq	%	Freq	%	Freq	%	Freq	%
Artisan	1	1.538462	0	0	0	0	4	17.3913
Business	37	56.92308	13	54.16667	9	50	10	43.47826
Civil Service	2	3.076923	0	0	9	50	7	30.43478
Farming	35	53.84615	11	45.83333	0	0	2	8.695652
Total	65	100	24	100	18	100	23	100

Traders' pooled result			Kano		Kaduna		Enugu	
Farming	Freq	%	Freq	%	Freq	%	Freq	%

Experience								
Male	14	21.53846	6	25	15	83.33333	3	13.04348
Female	51	78.46154	18	75	3	16.66667	14	60.86957
Total	65	100	24	100	18	100	23	100

APPENDIX II

Capital Sources and Volume

Male

	30% Ext. source		**20% Counterpart**		**Access = Disbursed (50%)**		**Capital Used**	
Capital	**₦105202.30**		**₦70134.80**		**₦350674.2**		**₦526011.3**	
Requirements	F	%	F	%	F	%	F	%
0 – 200000	100	75.19	118	88.72	54	40.60	30	22.56
200001-400000	16	12.03	9	6.77	44	33.08	41	30.83
400001 -600000	17	12.78	5	3.76	25	18.80	31	23.31
> 600000	0	0	1	0.75	10	7.52	31	23.31
Total	**133**	**100**	**133**	**100**	**133**	**100**	**133**	**100**
Mean	**13559.1**		**70134.8**		**350674.2**		**434368.1**	
Inadequacy					**0.170**			
Female	**102818.20**		**60545.50**		**342727.30**		**506192.00**	
0 – 200000	30	90.91	29	87.88	14	42.42	1	3.03
200001-400000	3	9.09	4	12.12	9	27.27	22	66.67
400001 -600000	0	0	0	0	7	21.21	0	0
> 600000	0	0	0	0	3	9.09	10	30.30
Total	**32**	**100**	**32**	**100**	**32**	**100**	**32**	**100**
Mean	**83817.70**		**60545.50**		**342727.3**		**487090.50**	
Inadequacy					**0.038**			
Inadequacy ratio	**Male : Female Inadequacy Ratio 0.285714 : 0.175819 (1.6 : 1)**							

Delay

	Male		Female	
	Freq	%	Freq	%
Yes	18	13.53383	18	56.25
No	115	86.46617	14	43.75
Total	133	100	32	100

Distribution Channel

Male	Distribution Channels		Female Distribution Channels	
	F	%	F	%

Processors	6	4.511278	4	12.90323
Processors-Marketers	16	12.03008	19	61.29032
Marketers	108	81.20301	5	16.12903
Consumers	4	3.007519	4	12.90323
Total	133	100	32	103.2258

Output Capital Inadequacy for Processors

Variable	Amount Accessed	CPF	Expected SAVE	Required Capital
MP	513333.33	102666.67	154000.00	770000.00
FP	608490.60	121698.12	182547.18	912735.90
KNM	408333.30	81666.66	122499.99	612499.95
KNF	408333.30	81666.66	122499.99	612499.95
KDM	911904.80	182380.96	273571.44	1367857.20
KDF	711818.20	142363.64	213545.46	1067727.30
ENUM	410714.30	82142.86	123214.29	616071.45
ENUF	442307.70	88461.54	132692.31	663461.55

Exp External	Actual saving	CPF	Ext Capital	Act Disbursment
256666.67	120119.9992	24023.99984	144143.9991	513333.33
304245.30	166117.9338	33223.58676	199341.5206	608490.6
204166.65	79624.9935	15924.9987	95549.9922	408333.3
204166.65	107799.9912	21559.99824	129359.9894	408333.3
455952.40	172350.0072	34470.00144	206820.0086	911904.8
355909.10	200732.7324	40146.54648	240879.2789	711818.2
205357.15	86250.003	17250.0006	103500.0036	410714.3
221153.85	128711.5407	25742.30814	154453.8488	442307.7

Capital Obtained	Inadequacy
657477.3291	0.171143036
807832.1206	0.129858391
503883.2922	0.215559157
537693.2894	0.139125152
1118724.809	0.222693186
952697.4789	0.120741184
514214.3036	0.198083067
596761.5488	0.111769938

Output of Marketers and Capital inadequacy

Variable	Amount Accessed	CPF	Expected SAVE	Required Capital	Expected External
MP	271600.00	54320.00	81480.00	407400.00	135800.00
FP	523333.33	104666.67	157000.00	785000.00	261666.67
KNM	238888.89	47777.78	71666.67	358333.33	119444.44
KNF	683333.33	136666.67	205000.00	1025000.00	341666.67
KDM	337777.78	67555.56	101333.33	506666.67	168888.89
KDF	783333.33	156666.67	235000.00	1175000.00	391666.67
ENUM	279411.76	55882.35	83823.53	419117.65	139705.88
ENUF	400000.00	80000.00	120000.00	600000.00	200000.00

Amount Dis	Actual Save	CPF	Actual External	Capital Obtained	%Inadequacy
271600	26616.8	54320	80936.8	352536.8	0.134666667
523333.3333	94200	104666.6667	198866.6667	722200	0.08
238888.8889	28666.66667	47777.77778	76444.44444	315333.3333	0.12
683333.3333	116166.6667	136666.6667	252833.3333	936166.6667	0.086666667
337777.7778	26346.66667	67555.55556	93902.22222	431680	0.148
783333.3333	164500	156666.6667	321166.6667	1104500	0.06
279411.7647	8382.352941	55882.35294	64264.70588	343676.4706	0.18
400000	60000	80000	140000	540000	0.1

APPENDIX III

Dissimilarity Analysis Cap Disbursed

Actors	States	Sex	Dismilarity	Sex Distribution	Capital Disbursed (N)	SumDis	f1	F	f1/F	m1	M	m1/M	(Dis (f1/F)-(m1/M))*50
Producer	Kano	M		47	473587	22258589							
		F		3	200000	600000	600000	1E+07	0.0625	22258589	33908589	0.65643	-29.69646
	Kaduna	M		61	262887	16036113							
		F		6	302000	1812000	1812000	1E+07	0.1511	16036113	40252781	0.39839	-12.36422
	Enugu	M		25	388200	9705000							
		F		23	373913	8599999	8599999	2E+07	0.55305	9705000	19366765	0.50112	2.5969212
Processors	Kano	M		18	408333.30	7349999							
		F		12	408333.30	4900000	4900000	1E+07	0.51042	7349999	33908589	0.21676	14.682872
	Kaduna	M		21	911904.80	19150001							
		F		11	711818.20	7830000	7830000	1E+07	0.65294	19150001	40252781	0.47574	8.8595877
	Enugu	M		14	410714.30	5750000							
		F		13	442308	5750000	5750000	2E+07	0.36977	5750000	19366765	0.2969	3.6437279
Marketers	Kano	M		18	238889	4300000							
		F		6	683333	4100000	4100000	1E+07	0.42708	4300000	33908589	0.12681	15.01359
	Kaduna	M		15	337778	5066667							
		F		3	783333	2350000	2350000	1E+07	0.19596	5066667	40252781	0.12587	3.5046369
	Enugu			14	279412	3911765							

		3		400000	1200000	1200000	2E+07	0.07717	3911765	19366765			4.69
Actors	States	Sex	Dismilarity	Sex Distribution	Inadequacy	Suminadequacy	f1	F	f1/F	m1	M	m1/M	((f1/F)-(m1/M))*50
Producer	Kano	M		47	8.6	404.2							
		F		3	17.8	53.4	53.4	55.56	0.96112	404.2	410.3	0.98508	-1.198085
	Kaduna	M		61	8.3	506.3							
		F		6	4.07	24.42	24.42	25.92	0.94213	506.3	513.2	0.98661	-2.22415
	Enugu	M		25	17.5	437.5							
		F		23	5.02	115.46	115.46	117.19	0.98524	437.5	442.8	0.98799	-0.137422
Processors	Kano	M		18	0.22	3.96							
		F		12	0.14	1.68	1.68	55.56	0.03024	3.96	410.3	0.00965	1.0293288
	Kaduna	M		21	0.22	4.62							
		F		11	0.12	1.32	1.32	25.92	0.05093	4.62	513.2	0.009	2.0961531
	Enugu	M		14	0.20	2.8							
		F		13	0.11	1.43	1.43	117.19	0.0122	2.8	442.8	0.00632	0.2939648
Marketers	Kano	M		18	0.12	2.16							
		F		6	0.08	0.48	0.48	55.56	0.00864	2.16	410.3	0.00526	0.1687562
	Kaduna	M		15	0.15	2.25							
		F		3	0.06	0.18	0.18	25.92	0.00694	2.25	513.2	0.00438	0.1279966
	Enugu			14	0.18	2.52							

			3	0.1	0.3	0.3	117.19	0.00256	2.52	442.8	0.00569	-0.156543	
Actors	States	Sex	Dismilarity	Sex Distribution	Output	Sumoutput	f1	F	f1/F	m1	M	m1/M	((f1/F)-(m1/M))*50
Producer	Kano	M		47	9311.3	437631.1							
		F		3	6881	20643	20643	916354	0.0225	437631.1	2583480	0.169	-7.343
	Kaduna	M		61	6928.8	422656.8							
		F		6	2447.7	14686.2	14686	1E+06	0.0142	422656.8	4456902	0.095	-4.03
	Enugu	M		25	16332.4	408310							
		F		23	16767.7	385657.1	385657	1E+06	0.3051	408310	2424695	0.168	6.834
Processors	Kano	M		18	28466.60	512398.8							
		F		12	28302.10	339625.2	339625	916354	0.3706	512398.8	2583480	0.198	8.615
	Kaduna	M		21	71585.50	1503296							
		F		11	43491.60	478407.6	478408	1E+06	0.4635	1503296	4456902	0.337	6.31
	Enugu	M		14	30906.70	432693.8							
		F		13	40066.4	520863.2	520863	1E+06	0.412	432693.8	2424695	0.178	11.68
Marketers	Kano	M		18	90747.2	1633450							
		F		6	92680.9	556085.4	556085	916354	0.6068	1633450	2583480	0.632	-1.271
	Kaduna	M		15	168730	2530950							
		F		3	179700	539100	539100	1E+06	0.5223	2530950	4456902	0.568	-2.279
	Enugu			14	113120.8	1583691							
				3	119200	357600	357600	1E+06	0.2829	1583691	2424695	0.653	-18.51

Performance of some selected indicators on Maize Value Chain in 2010

States	Total Output of Maize(t)	Mean Area (Ha)	Yield(t/Ha)	Processing (₦/t)	Marketing (₦/t)
Enugu	1,195.58	7.45	160.48	33800	35383
Kaduna	1,228.00	3.39	362.24	27500	37502
Kano	4,055.53	5.17	784.44	404905	197000
Total	6,479.11	16.00	404.94	478205	588332

Performance of some selected indicators on Maize Value Chain in 2022

States	Total Output of Maize(t)	Mean Area (Ha)	Yield(t/Ha)	Processing (₦/t)	Marketing (₦/t)
Enugu	10410.3	1.89	5508.10	108853.3	115700.2
Kaduna	8627.39	2.90	2974.96	108442.1	106826.6
Kano	4885.07	2.75	1776.39	116948.6	95180.79
Total	14539.34	7.54	5174.14	455969.1	486939.2

Appendix performance index (Output and yield)

43300.00	60803.00	10410300.00	10410.3	1195.58	-7.71	870.732197
37323.90	48950.00	8627390.00	8627.39	1228.00	-6.03	702.556189
36130.70	12720.00	4885070.00	4885.07	4055.53	-0.20	120.45454
72076.00	73317.40	14539340.00	14539.34	6479.11	-1.24	224.403352

1041030	10410.3	10410.3	1.89	5508.095238
862739	8627.39	8627.39	2.9	2974.962069
488507	4885.07	4885.07	2.75	1776.389091
1453934	14539.34	14539.34	2.81	5174.142349

Appendix Performance index on Processing

154.44	51.9	206.34	1.249	1.227
90.73	103.75	194.48	1.279	1.127
82.49	140.53	223.02	1.194	1.207
327.66	296.18	623.84	1.185	1.277

419.91	467.24	88715	1.227	108853.305
408.66	553.56	96222	1.127	108442.194
501.23	467.69	96892	1.207	116948.644
507.33	445.88	95321	1.277	455969.06

Marketing Performance Index

Total CostM	Total Cost F	Total Cost	Priofit M	Profir F	Profit
784.04	313.06	1097.1	118.92	72.3	191.22
633.68	387.07	1020.75	116.7	99.76	216.46
478.27	436.71	914.98	117.8	109.45	227.25
1384.28	273.96	1658.24	478.99	224.56	703.55

	Mrk	%profit			
6.59	4.33	0.0546	1.0546	1097.1	115700.166
5.43	3.88	0.04655	1.04655	1020.75	106826.591
4.06	3.99	0.04025	1.04025	914.98	95180.7945
2.89	1.22	0.02055	1.02055	1658.24	486939.235

APPENDIX IV

Performance Index

B	C	(B-C)/B	(1-(B-C))/B	%
1195.58	10410.3	-7.707322	8.70732197	870.732197
7.45	1.89	0.74630872	0.25369128	25.3691275
160.48	5508.1	-33.322657	34.322657	3432.2657
33800	108853.3	-2.2205118	3.22051183	322.051183
35383	115700.2	-2.2699375	3.26993754	326.993754
1228	8627.39	-6.0255619	7.02556189	702.556189
3.39	2.9	0.14454277	0.85545723	85.5457227
362.24	2974.96	-7.2126767	8.21267668	821.267668
27500	108442.1	-2.9433491	3.94334909	394.334909
37502	106826.6	-1.8485574	2.84855741	284.855741
4055.53	4885.07	-0.2045454	1.2045454	120.45454
5.17	2.75	0.46808511	0.53191489	53.1914894
784.44	1776.39	-1.2645327	2.26453266	226.453266
404905	116948.6	0.71117027	0.28882973	28.8829725
197000	95180.79	0.51684878	0.48315122	48.3151218
6479.11	14539.34	-1.2440335	2.24403352	224.403352
16	7.54	0.52875	0.47125	47.125
404.94	5174.14	-11.777547	12.7775473	1277.75473
478205	455969.1	0.04649868	0.95350132	95.3501323
588332	486939.2	0.17233943	0.82766057	82.7660573

APPENDIX V

Performance of CADP relative to baseline in terms of CIGs' Technology adequacy and demographic variables

B	C	(C-B)/C	1-{(C-B)/C}	[1-{(C-B)/C}]100
48	64.6	0.256966	0.743034056	74.30341
14	45	0.688889	0.311111111	31.11111
97.9	91.5	-0.06995	1.069945355	106.9945
29	41	0.292683	0.707317073	70.73171
6	8	0.25	0.75	75
50	56.4	0.113475	0.886524823	88.65248
3	20	0.85	0.15	15
97.9	91	-0.07582	1.075824176	107.5824
25	41	0.390244	0.609756098	60.97561
8	9	0.111111	0.888888889	88.88889
45	59.6	0.244966	0.755033557	75.50336
3	24	0.875	0.125	12.5
97.1	96	-0.01146	1.011458333	101.1458
21	44	0.522727	0.477272727	47.72727
8	7	-0.14286	1.142857143	114.2857
47.7	58.3	0.181818	0.818181818	81.81818
12	30	0.6	0.195	19.5
97.6	92.8	-0.05172	1.051724138	105.1724
26	42	0.380952	0.619047619	61.90476
7	8	0.125	0.875	87.5

APPENDIX VI

Multivariate regression on production performance

SUMMARY OUTPUT

Regression Statistics								
Multiple R	0.686831							
R Square	0.537004							
Adjusted R Square	0.408764							
Standard Error	217.2391							
Observations	165							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	8	2286835	47462.7	10.05716	8.83228E-07			
Residual	156	7362081	47192.83					
Total	164	9648916						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-142.749	110.4118	-1.29288	0.197965	-360.8439998	75.34597	-360.844	75.34597
Age	5.266054	2.567054	2.051399	0.0419	0.195383539	10.33672	0.195384	10.33672
Hhold Size	-8.15929	4.006908	-2.03631	0.043411	-16.07408921	-0.2445	-16.0741	-0.2445
Education	7.299213	3.479096	2.09802	0.037515	0.426998819	14.17143	0.426999	14.17143
FarmnExp	-0.25673	1.543851	-0.16629	0.868143	-3.306278303	2.792821	-3.30628	2.792821
Mstatus	53.17548	56.8139	0.935959	0.350741	-59.04830709	165.3993	-59.0483	165.3993
Sex	-58.5188	45.48128	-1.28666	0.20012	-148.3573677	31.31983	-148.357	31.31983
Value added	-5.6E-05	0.000147	-0.37935	0.70494	-0.00034535	0.000234	-0.00035	0.000234
Amt Disbursed	0.000225	5.64E-05	3.991814	0.000101	0.000113802	0.000337	0.000114	0.000337

Multivariate regression on processing performance

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.661317954
R Square	0.437341436
Adjusted R Square	0.38107558
Standard Error	4.69333644
Observations	89

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	1369.711	171.2139	7.772767787	1.16E-07
Residual	80	1762.193	22.02741		
Total	88	3131.904			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-2.669684846	3.688835	-0.72372	0.471348394	-10.0107	4.67133	-10.0107	4.67133
Age	0.200157356	0.07866	2.544582	0.012864379	0.043619	0.356696	0.043619	0.356696
Hhold Size	0.494514352	0.247746	1.99605	0.049330999	0.001483	0.987545	0.001483	0.987545
Education	-0.307896788	0.170756	-1.80314	0.075131951	-0.64771	0.031919	-0.64771	0.031919
FarmnExp	-0.014485774	0.065715	-0.22043	0.826095383	-0.14526	0.116291	-0.14526	0.116291
Mstatus	-6.377226861	1.21761	-5.23749	1.28691E-06	-8.80035	-3.9541	-8.80035	-3.9541
Sex	1.839481334	1.10224	1.668857	0.099055054	-0.35405	4.03301	-0.35405	4.03301
Value added	9.82371E-06	1.03E-05	0.954706	0.342602563	-1.1E-05	3.03E-05	-1.1E-05	3.03E-05
Amt Disbursed	2.60282E-06	1.11E-06	2.344997	0.021506155	3.94E-07	4.81E-06	3.94E-07	4.81E-06

Multivariate regression on Marketing performance

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.666435
R Square	0.444136
Adjusted R Square	0.364727
Standard Error	0.075113
Observations	65

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	0.252444	0.031555	5.59301	3.25E-05
Residual	56	0.315949	0.005642		
Total	64	0.568393			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.207955	0.072396	2.872471	0.005742	0.062929	0.352982	0.062929	0.352982
Age	0.000691	0.002135	0.323904	0.747217	-0.00359	0.004968	-0.00359	0.004968
Hhold Size	-0.00228	0.002725	-0.83768	0.405769	-0.00774	0.003176	-0.00774	0.003176
Education	0.002101	0.002832	0.741857	0.461274	-0.00357	0.007774	-0.00357	0.007774
FarmnExp	0.000364	0.001577	0.230533	0.818518	-0.0028	0.003522	-0.0028	0.003522
Mstatus	-0.07632	0.020889	-3.65351	0.000571	-0.11816	-0.03447	-0.11816	-0.03447
Sex	-0.04588	0.020211	-2.27004	0.027074	-0.08637	-0.00539	-0.08637	-0.00539
Value added	2.97E-08	1.28E-08	2.318295	0.02411	4.03E-09	5.53E-08	4.03E-09	5.53E-08
Amt Disbursed	-1.1E-07	4.75E-08	-2.39493	0.019994	-2.1E-07	-1.9E-08	-2.1E-07	-1.9E-08

APPENDIX VII

FACTORS CONSTRAINING THE IMPLEMENTATION OF CADP ALONG THE VALUE CHAIN

Factor Analysis

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
High cost of inputs	.61	.489	317
Lack of access to credit sources	.62	.487	317
Insufficient access to fair market price information	.32	.465	317
Poor infrastructure (roads, irrigation, poor harvest facilities)	.60	.490	317
Inability to provide percentage requirement for the fund	.58	.494	317
Delay in fund disbursement	.33	.473	317
Lack of training	.62	.486	317
Land tenure problem	.09	.280	317
Funding do not obey sharing formula	.42	.494	317
Funds are not readily available when needed	.15	.359	317
Group not financially buoyant to finance counterpart contributions	.17	.374	317
Embezzlement of group funds by group officers	.27	.445	317
Management asks for gratification before approving funds	.28	.450	317
Other socio-economic factors	.26	.440	317

Correlation Matrix															
		High cost of inputs	Lack of access to credit sources	Insufficient access to fair market price information	Poor infrastructure (roads, irrigation, poor harvest facilities)	Inability to provide percentage requirement for the fund	Delay in fund disbursement	Lack of training	Land tenure problem	Funding do not obey sharing formula	Funds are not readily available when needed	Group not financially buoyant to finance counterpart contributions	Embezzlement of group funds by group officers	Management asks for gratification before approving funds	Other socio-economic factors
Correlation	High cost of inputs	1.000	.070	.433	-.189	-.131	-.117	-.013	.152	.027	.176	.013	.082	.184	-.096
	Lack of access to credit sources	.070	1.000	-.119	-.152	.050	-.539	.399	.056	.121	-.335	.059	.074	.307	.309
	Insufficient access to fair market price information	.433	-.119	1.000	.080	-.248	.066	-.016	-.013	-.068	.225	.005	.059	.301	-.204
	Poor infrastructure (roads, irrigation, poor harvest facilities)	-.189	-.152	.080	1.000	.159	.261	-.209	-.006	-.002	.127	.018	-.070	-.124	-.161

	Inability to provide percentage requirement for the fund	-.131	.050	-.248	.159	1.000	.020	-.031	.030	.101	-.372	-.030	-.071	-.152	-.104
	Delay in fund disbursement	-.117	-.539	.066	.261	.020	1.000	-.315	-.096	-.074	.447	.005	-.057	-.264	-.316
	Lack of training	-.013	.399	-.016	-.209	-.031	-.315	1.000	-.111	.005	-.251	-.051	.037	.328	.302
	Land tenure problem	.152	.056	-.013	-.006	.030	-.096	-.111	1.000	-.053	.060	.015	.093	.011	-.053
	Funding do not obey sharing formula	.027	.121	-.068	-.002	.101	-.074	.005	-.053	1.000	-.074	-.107	.099	.166	.250
	Funds are not readily available when needed	.176	-.335	.225	.127	-.372	.447	-.251	.060	-.074	1.000	.070	.000	-.166	-.172
	Group not financially buoyant to finance counterpart contributions	.013	.059	.005	.018	-.030	.005	-.051	.015	-.107	.070	1.000	-.026	-.054	.022
	Embezzlement of group funds by group officers	.082	.074	.059	-.070	-.071	-.057	.037	.093	.099	.000	-.026	1.000	.124	.121
	Management asks for gratification before approving funds	.184	.307	.301	-.124	-.152	-.264	.328	.011	.166	-.166	-.054	.124	1.000	.155

	Other socio-economic factors	-.096	.309	-.204	-.161	-.104	-.316	.302	-.053	.250	-.172	.022	.121	.155	1.000
Sig. (1-tailed)	High cost of inputs		.107	.000	.000	.010	.019	.412	.003	.319	.001	.411	.073	.000	.044
	Lack of access to credit sources	.107		.017	.003	.187	.000	.000	.162	.016	.000	.147	.093	.000	.000
	Insufficient access to fair market price information	.000	.017		.078	.000	.122	.388	.412	.113	.000	.464	.147	.000	.000
	Poor infrastructure (roads, irrigation, poor harvest facilities)	.000	.003	.078		.002	.000	.000	.456	.487	.012	.372	.107	.014	.002
	Inability to provide percentage requirement for the fund	.010	.187	.000	.002		.362	.292	.295	.036	.000	.296	.105	.003	.032
	Delay in fund disbursement	.019	.000	.122	.000	.362		.000	.043	.094	.000	.465	.158	.000	.000
	Lack of training	.412	.000	.388	.000	.292	.000		.024	.468	.000	.182	.254	.000	.000
	Land tenure problem	.003	.162	.412	.456	.295	.043	.024		.172	.142	.397	.048	.426	.173
	Funding do not obey sharing formula	.319	.016	.113	.487	.036	.094	.468	.172		.095	.029	.039	.002	.000
	Funds are not readily available when needed	.001	.000	.000	.012	.000	.000	.000	.142	.095		.106	.497	.002	.001

	Group not financially buoyant to finance counterpart contributions	.411	.147	.464	.372	.296	.465	.182	.397	.029	.106		.321	.168	.351
	Embezzlement of group funds by group officers	.073	.093	.147	.107	.105	.158	.254	.048	.039	.497	.321		.014	.016
	Management asks for gratification before approving funds	.000	.000	.000	.014	.003	.000	.000	.426	.002	.002	.168	.014		.003
	Other socio-economic factors	.044	.000	.000	.002	.032	.000	.000	.173	.000	.001	.351	.016	.003	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.638
Bartlett's Test of Sphericity	Approx. Chi-Square	756.654
	Df	91
	Sig.	.000

Communalities

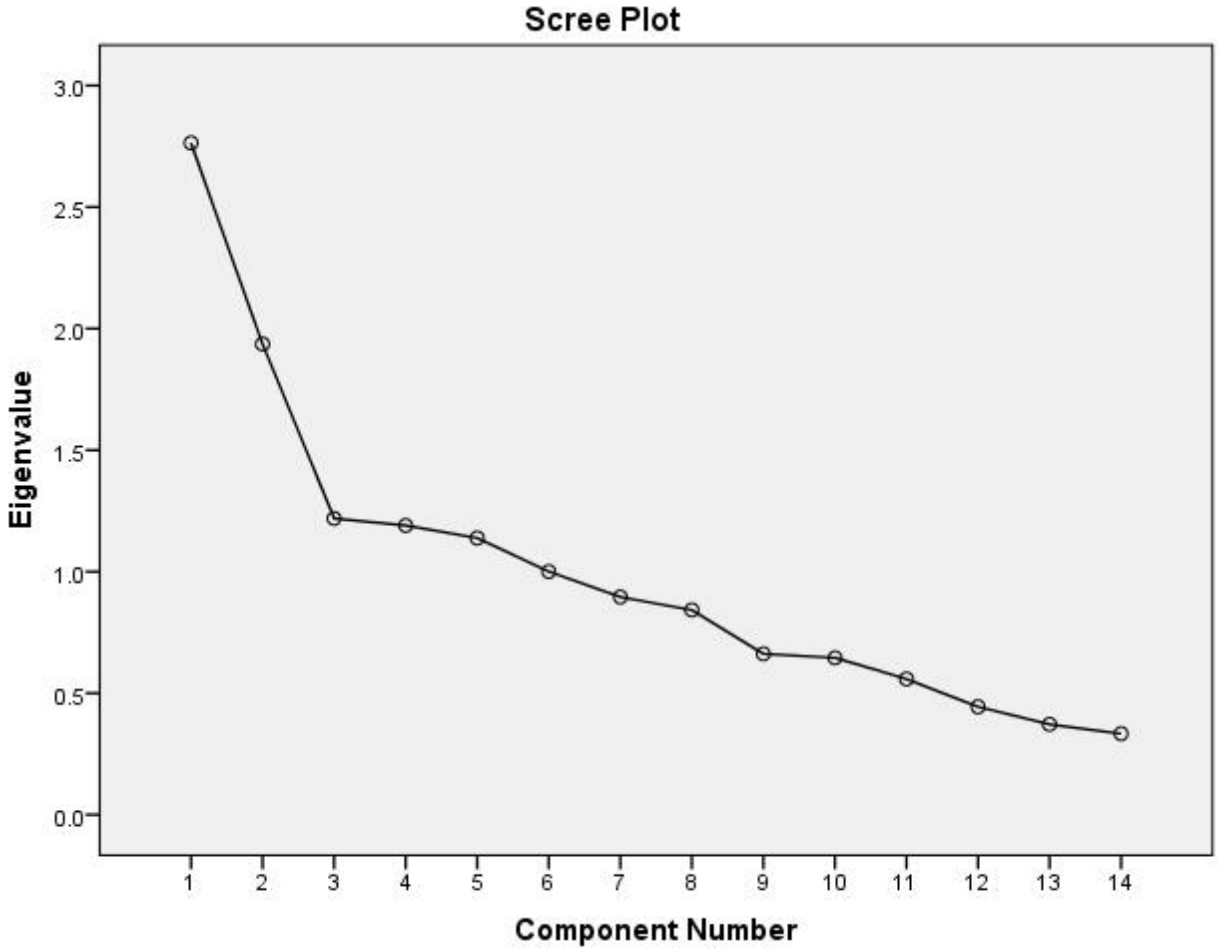
	Initial	Extraction
High cost of inputs	1.000	.621
Lack of access to credit sources	1.000	.637
Insufficient access to fair market price information	1.000	.771
Poor infrastructure (roads, irrigation, poor harvest facilities)	1.000	.661
Inability to provide percentage requirement for the fund	1.000	.724
Delay in fund disbursement	1.000	.654
Lack of training	1.000	.558
Land tenure problem	1.000	.684
Funding do not obey sharing formula	1.000	.669
Funds are not readily available when needed	1.000	.694
Group not financially buoyant to finance counterpart contributions	1.000	.840
Embezzlement of group funds by group officers	1.000	.436
Management asks for gratification before approving funds	1.000	.636
Other socio-economic factors	1.000	.663

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.764	19.740	19.740	2.764	19.740	19.740	2.618	18.697	18.697
2	1.937	13.832	33.572	1.937	13.832	33.572	1.707	12.192	30.889
3	1.219	8.707	42.279	1.219	8.707	42.279	1.371	9.793	40.682
4	1.190	8.500	50.779	1.190	8.500	50.779	1.300	9.285	49.966
5	1.138	8.131	58.910	1.138	8.131	58.910	1.199	8.567	58.533
6	1.001	7.146	66.056	1.001	7.146	66.056	1.053	7.524	66.056
7	.896	6.398	72.455						
8	.842	6.015	78.470						
9	.662	4.726	83.196						
10	.646	4.611	87.807						
11	.558	3.987	91.793						
12	.444	3.172	94.965						
13	.372	2.654	97.619						
14	.333	2.381	100.000						

Extraction Method: Principal Component Analysis.


Scree Plot
Eigenvalue
3.0
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1.5
1.0
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1
2
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10
11
12
13
14
Component Number

Component Matrix[a]

	Component					
	1	2	3	4	5	6
Delay in fund disbursement	-.756		-.242	.142		
Lack of access to credit sources	.748		.164	-.089		.207
Lack of training	.635	.064	-.183	-.154	-.304	
Funds are not readily available when needed	-.593	.432	-.295	-.089	.241	.062
Other socio-economic factors	.575	-.094	-.453		.317	.132
Management asks for gratification before approving funds	.510	.463		.248	-.271	.162
Insufficient access to fair market price information	-.155	.748	.097	.173	-.350	.158
High cost of inputs	.051	.700	.339	.084		-.073
Inability to provide percentage requirement for the fund		-.591	.486	.332	-.141	.084
Land tenure problem		.148	.602		.545	-.051
Funding do not obey sharing formula	.261	-.059	-.259	.669	.233	.167
Embezzlement of group funds by group officers	.171	.230	-.074	.303	.505	
Group not financially buoyant to finance counterpart contributions	-.051		.086	-.517	.171	.729
Poor infrastructure (roads, irrigation, poor harvest facilities)	-.399	-.207	.062	.337	-.183	.555

Extraction Method: Principal Component Analysis.

a. 6 components extracted.

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
Delay in fund disbursement	-.783		.052		-.192	
Lack of access to credit sources	.761			.146	.070	.170
Funds are not readily available when needed	-.658	.205	-.421	.056		.196
Lack of training	.643	.078	-.170		-.326	-.053
Insufficient access to fair market price information	-.139	.860	-.062	-.058	-.063	
High cost of inputs	.058	.656	-.175		.389	-.068
Management asks for gratification before approving funds	.457	.576		.253	-.170	
Inability to provide percentage requirement for the fund	.116	-.239	.787	-.051	.126	-.125
Poor infrastructure (roads, irrigation, poor harvest facilities)	-.384	.102	.587	.116	-.207	.319
Funding do not obey sharing formula			.199	.775	-.096	-.133
Embezzlement of group funds by group officers		.071	-.165	.559	.302	
Other socio-economic factors	.427	-.284	-.302	.513	-.165	.139
Land tenure problem					.821	.064
Group not financially buoyant to finance counterpart contributions				-.116	.072	.904

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 10 iterations.

Component Transformation Matrix

Component	1	2	3	4	5	6
1	.952	-.012	-.082	.285	-.025	-.070
2	-.045	.842	-.504	.067	.171	.042
3	.184	.205	.515	-.393	.710	.007
4	-.184	.271	.508	.659	-.031	-.446
5	-.154	-.381	-.315	.513	.660	.184
6	.016	.176	.340	.252	-.171	.872

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Component Score Coefficient Matrix

	Component					
	1	2	3	4	5	6
High cost of inputs	.034	.357	-.038	-.038	.287	-.075
Lack of access to credit sources	.299	.038	.077	.030	.060	.197
Insufficient access to fair market price information	-.033	.527	.076	-.043	-.110	.037
Poor infrastructure (roads, irrigation, poor harvest facilities)	-.142	.158	.475	.176	-.188	.333
Inability to provide percentage requirement for the fund	.070	-.037	.568	-.031	.126	-.085
Delay in fund disbursement	-.313	-.008	.012	.071	-.166	-.013
Lack of training	.254	.056	-.103	-.102	-.275	-.030
Land tenure problem	.012	-.025	.049	.046	.688	.049
Funding do not obey sharing formula	-.080	.034	.176	.626	-.070	-.077
Funds are not readily available when needed	-.277	.051	-.303	.123	.003	.149
Group not financially buoyant to finance counterpart contributions	.063	-.018	.010	-.058	.041	.860
Embezzlement of group funds by group officers	-.072	-.008	-.098	.451	.256	-.008
Management asks for gratification before approving funds	.161	.370	.087	.134	-.173	.002
Other socio-economic factors	.096	-.209	-.239	.363	-.115	.158

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Component Scores.

Component Score Covariance Matrix

Component	1	2	3	4	5	6
1	1.000	.000	.000	.000	.000	.000
2	.000	1.000	.000	.000	.000	.000
3	.000	.000	1.000	.000	.000	.000
4	.000	.000	.000	1.000	.000	.000
5	.000	.000	.000	.000	1.000	.000
6	.000	.000	.000	.000	.000	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Component Scores.

Department of Agricultural Economics,
Federal University of Technology Owerri,
Imo State, Nigeria,
April 19, 2019.

Dear Sir/Madam,

I am a postgraduate student of the Department of Agricultural Economics, Federal University of Technology Owerri carrying out a research on "**ASSESSMENT OF COMMERCIAL AGRICULTURAL DEVELOPMENT PROJECTS (CADP) IN NIGERIA.**"

This research work is purely for academic purpose, and the information provided will be treated with absolute confidentiality.

Thanks in advance for your maximum cooperation.

Sincerely,

OSHAJI IFEDAYO OLUWAKEMI

QUESTIONNAIRE

A. ROLES AND OPERATIONS IN MAIZE VALUE CHAIN

1) What is your area of specialization / interest

Production ☐ (b) Processing ☐ (c) Marketing ☐

2) Please specify the end-product based on the option selected above?

(a) ……

(b) ……..

3) Who and where do you sell your end-product directly to?

(a) Producer ☐

(b) Processor ☐

(c) Marketer ☐

(d) consumers ☐

B. SOCIO-ECONOMIC CHARACTERISTICS

4) Name (optional) ……

5) Age (years) ☐

6) Level of Education: None ☐ Primary ☐ Secondary ☐ Tertiary

7) Marital Status: ☐ Married ☐ Single ☐ Divorced/Separated ☐

Widowed ☐ Others ☐

8) Household Size in numbers? ☐

9) Farming Experience ☐ in years

10) Major Occupation (Please specify) ……..

11) Sex: Male ☐ `Female ☐

12) Annual Income: Please indicate the range that matches your annual income?

(1) N20,000 - N50,000 ☐ (6) N171,000 –N200,000 ☐

(2) N51,000 - N80,000 ☐ (7) N201,000 – N230,000 ☐

(3) N81,000 –110,000 ☐ (8) N231,000 – N260,000 ☐

(4) N110,000 – N140,000 ☐ (9) Above N260,000 ☐

(5) N141,000 – N170,000 ☐

13) Farm Size: Please specify

(1) 0-0.9 hectare ☐ (3) 2-2.9 hectares ☐ (5) 4-4.9 hectares ☐

(2) 1-1.9 hectares ☐ (4) 3-3.9hectares ☐ (6) Above 5 hectare ☐

C. PERFORMANCE OF MAIZE VALUE CHAIN

For Producer (Farmer) only

14) Quantity of Maize produced in Kilogram ……..

For Processor only

15) What did you process into? .....

16) Quantity processed in Kilogram ……..

For Marketer only

17) What value added products did you market? ……..

18) Indicate the quantity marketed in Kilogram ……..

D.FACTORS AFFECTING THE AVAILABILITY OF MATCHING GRANT

a) Do you have access to the CADP grant? Yes ☐ No ☐

b) Are the funds readily available? Yes ☐ No ☐

c) How much was disbursed to you? ……

d) Are there delays in approving funds by the World Bank?

Yes ☐ No ☐

e) Are there delays in approving funds by national coordinating office?

Yes ☐ No ☐

f) Are there delays in approving funds by the State Commercial Agricultural Development Office? Yes ☐ No ☐

g) What are the consequences of these delays? .....

h) Do the funds obey the sharing formula? Yes ☐ No ☐

i) Does Management ask for gratification before approving funds?

Yes ☐ No ☐

j) If yes, what type of gratification and the amount? …….

k) Have you experienced any form of embezzlement of group funds by group officers? Yes ☐ No ☐

l) What was the amount of grant accessed? ……

E. MATERIALS (INPUTS)

Estimated quantity of monthly material needs (quantity/ cycle etc)

PRODUCERS ONLY

a) Please indicate your production costs last season

S/No	Item of cost and return	Units of measure	Quantity	Unit price	Total Cost
	Inputs used				
	Maize Seeds				
	Fertilizer				
	Pesticides				
	Insecticide				
	Others				
	Labour				

	Land Preparation				
	Land clearing				
	Land plowing				
	Ridge/mounds making Planting				
	First weeding				
	fertilizer and agrochemical application				
	Second weeding				
	Harvesting				
	Fixed Cost				
	Land (Rent)				
	Hoes/cutlasses				
	Bags				
	Scale				
	Barrows				
	Other equipments, please specify: i. ……. ii. ……. iii. …….				
	Revenue				
	Quantity Produced				
	Quantity sold				

Depreciation schedule of fixed items

S/No	Items	Lifespan (years)	Estimated value	Salvage Value	Depreciation

PROCESSOR ONLY

Please estimate the quantity of material needed (quantity/cycle) for processing

S/No	**INPUT TYPE**	**QUANTITY/ MONTH**	**QUANTITY/ PROCESSING CYCLE**	**UNIT OF MEASURE**	**UNIT PRICE (₦)**	**TOTAL AMOUNT (₦)**
	Variable costs					
	Union charges					
	Transport Cost					
	Loading					
	Offloading					
	Intermediat					

	e Product (Maize seed or Cob)					
	Fixed Costs					
	Rent					
	Bags					
	Scale					
	Barrows					
	Machines/equipments					
	Others …….					

MARKETERS ONLY

a) How long do you store maize before selling ……
b) Where do you store it? …….
c) If hired how much do you pay?.....
d) What is the quantity of maize bought (in bags/ kg)?.....
e) What is the price of the quantity of maize bought? ……
f) What is the quantity of maize sold (in bags/kg)?.....
g) What is the price of the quantity of maize sold (in naira)……
h) What is the cost of transporting the maize to the market?.....
i) Please specify the costs of the following:

	Fixed Inputs	**Quantity**	**Unit Price**
a.	Scales		
b.	Bags		

c.	Measuring Tools (Cup, Tin, etc)		
d.	Others		

E. PROBLEMS AND CONSTRAINTS AFFECTING IMPLEMENTATION OF CADP ALONG MAIZE VALUE CHAIN

Identify the constraints and problems faced in maize value chain implementation

High cost of inputs	
Lack of access to credit sources	
Insufficient access to fair market price information	
Poor infrastructure (roads, irrigation, poor harvest facilities)	
Inability to provide percentage requirement for the fund	
Delay in fund disbursement	
Lack of training	
Land tenure problem	
funding do not obey sharing formula	
funds are not readily available when needed'	
Group not financially buoyant to finance counterpart contributions	
Embezzlement of group funds by group officers	
Management asks for gratification before approving funds	
Others	

F. What can be done to minimize these problems?

a) …….
b) …….
c) …….

STUDY TIMETABLE

The study timetable entails the stages and time spent in completing the programme. These are stated below:

Activity	**Duration**
Course work	April 2016 - January 2018
Selection and approval of research topic	January 2018 – March 2018
Collection of research materials and proposal writing	March 2018 – June 2018
Submission of proposal for candidacy	September 2018 – December 2018
Candidacy	May 2019
Structuring of questionnaire	May 2019 – August 2019
Approval of questionnaire by my supervisors	September 2019
Distribution of questionnaire	October 2020 – February 2021
Retrieval of questionnaire	April 2021
Analysis of field data	April 2021 – May 2022
Submission of research findings for presentation at departmental/school level/ post graduate school	November 2022
Preparation for post graduates school internal defense	February 2023 – May 2023
Post graduate school internal defense	
Final correction and preparation for external defense	
External defense	