

**LIVELIHOOD DIVERSIFICATION STRATEGIES  
AMONG FADAMA AND NON-FADAMA USERS IN  
IMO STATE, NIGERIA**

**BY**

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## CERTIFICATION

This is to certify that this research work on “**Livelihood** diversification strategies among Fadama and non-Fadama users in Imo State, Nigeria” was carried out by Enyia, Charles .Onyemaechi, in partial fulfillment of the requirement for the award of the degree of Doctor of Philosophy (Ph.D) in Agricultural Economics.

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## **DEDICATION**

This work is dedicated to my beloved wife Obiageli Charles-Enyia, and my lovely children; Chidiogo, Chiagoziem and Chiamaka

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## **ABSTRACT**

The study examined the livelihood diversification strategies among Fadama and Non Fadama users in Imo State, Nigeria. Data used for the study were collected with the aid of structured questionnaire administered to 150 randomly selected Fadama users and 150 non-Fadama user making it a total of 300 questionnaires. Data were analyzed using descriptive statistics, net farm income model, Gini coefficient model, Ordinary Least Squares (OLS), multiple regression analysis, and logit model. Result of the analysis showed that farming activities is the major source of income generation among Fadama and non Fadama users in the study area, contributing 63.6% and 51.9% of Fadama and non Fadama users' total household income. Non-farm activities contributed 36.4% of the Fadama users' total household income. In the same vain, non-farm activities among non Fadama users contributed 48.1% of their total household income. The analysis further showed that Fadama users mean household income was ₦560, 050 per annum while non Fadama users mean household income was found to be ₦467, 383 per annum. The Gini coefficient of 0.249 and 0.233 were estimated for Fadama and non-Fadama users in the study area. Livelihood diversification strategies among Fadama users were influenced by household size, age, educational level, extension visit and access to credit. Livelihood diversification strategies among Non Fadama users were influenced by household size, age, educational level and cooperative membership. It was also noted that household size, gender, age, cooperative membership and farm size were among the socio economic factors that affected value addition among Fadama users, while household size, gender, age, educational level, cooperative membership and farm size affected value addition among non Fadama users. In addition, the result showed that there was a significant difference between Fadama and non Fadama users' income. Also there was a significant difference between the livelihood diversification strategies of Fadama and non Fadama users in the study area. Despite growing concern that farming alone may not provide sufficient income for sustainable livelihood, it still dominates livelihood activities and income generation among Fadama and non Fadama users. It is therefore recommended that Government policies aimed at sustainable livelihood and income generation should focus on both farm and non-farm sectors. Hence farming as a primary source of income may not guarantee sufficient livelihood for most Fadama and non-Fadama users' households in Imo State.

Key words: livelihood, livelihood diversification strategies, household income, value addition, Fadama users and Non-Fadama users.

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background of the study**

Agriculture is the major sector upon which the majority of Nigeria's rural poor depend on for their livelihood. It provides employment for over 60% of the population (Oseni & Winter, 2009; Liverpool-Taise, *et al.* 2011; Oladimeji, *et al.* 2014). However, it has been established that Farming as a primary source of income has failed to guarantee sufficient livelihood for most farming households in developing countries (Babatunde, 2012), hence diversification into non-farm activities is seen as a form of self-insurance. This is because diversification offers people options for coping with crisis. The resultant effect of this is that, rural households diversify their income sources by combining two or more jobs (multiple job holding) to enhance consumption smoothing and acquire other basic needs, (Oluwatayo, 2009). This goes to prove that one of the most established characteristics of rural households in developing countries is that they obtain their incomes from many different sources (Davis, *et al.* 2010).

Presently the concept of livelihood diversification is emerging as a survival strategy of rural households in developing countries (Ellis, 2000; Bryceson, 2000). The rural people are looking for diverse opportunities to increase and stabilize their incomes, which are determined by their portfolio of assets, social, human, financial, natural and physical capital (Sudan, 2007). There has been an increased recognition among researchers especially in the past one or two decades that Africans diversify their livelihood strategies, including on-farm (crop, livestock, fisheries and off-farm

activities or market and non-market activities to mitigate risks inherent in unpredictable agro-climatic and politico-economic circumstances (Ellis, 2000; Bryceson, 2002).

In different areas of the world impact of livelihoods diversification is different and varies from negative to positive effects like- the withdrawal of critical labour from the family farm for the alleviation of credit constraints and a reduction in the risk of innovation. The contribution made by livelihood diversification to rural income sources is a significant one which has often been ignored by policy makers who chose to focus their activities on agriculture (Sudan, 2007). Scholarly, literature on rural livelihoods diversification portrays it as a continuously occurring phenomenon that results from the increased importance of off-farm wage labour in the household livelihood portfolio or through the development of new forms of on-farm commodities. Consistent with this observation, Warren (2002) argued that in either case diversification can be both temporary (occasional diversification) or can be a deliberate attempt to optimize household capacity of the ever changing opportunities (strategic diversification). Livelihoods diversification is important because it can lead to some form of household specialization and also increase the household's ability to cope with risk. Diversified households are said to be more likely to enjoy higher flexibility and resilience capacity than households that are completely dependent on agriculture, (Simtowe, 2010). Furthermore, the perceived advantage of livelihoods diversification are increasingly becoming important in the light of reiterated environmental, economic and political shocks affecting the rural areas of developing countries, (Simtowe, 2010).

Livelihood literature suggests that though exogenous trends and shocks play a significant role in approaching rural people towards a diversified livelihood strategy, diversification choices are also confidently embedded in the micro-economic reason of farming households (Ellis, 2000). The availability of key-assets (such as savings, land, labour, education and/or access to market or employment opportunities, access to Common Property Resources (CPRs) and other public goods is an evident requisite in making rural households and individuals more or less capable to diversify ( Abdulai & Crole, 2001; Sudan, 2007). Diversification may also develop as a coping response to the loss of capital assets needed for undertaking conventional non-farm land, increased producer/consumer ratio, credit delinquency, and environmental deterioration can be indeed important drivers towards diversification (Sudan, 2007; Herani, *et al*, 2007).

In Nigeria, majority of the farm household populace either depend entirely on farming for survival and generation of income, or depend on farming to supplement their main sources of income (World-Bank, 2010). Sample studies of rural income portfolios derived from both large-scale, national representative sample surveys and purpose households studies converge on the once starting figure that on average, roughly 50 percent of rural households income in sub-Saharan African are generated from engagement in non-farm activities and transfer from urban areas or abroad, with remittance and pension payments being the chief categories of such transfer, (Ellis 2000; Ellis and Freeman, 2004). Evidence from a sample of rural villages in Tanzania,(Chapmen & Tripp 2004; Ellis & Madox, 2003) shows that an average half of the household income came from crops and livestock and the other half from non-

farm wage employment, self employment and remittance. The proportion of non-farm income was higher for the upper income groups than for the lowest income groups. Therefore, the poorest households were more reliant on agriculture, and the reliance on agriculture decreased with increased diversification into non-farm activities.

However, one important means of income generation that rural farmers have not paid much attention to is the value addition. Value addition is any act that takes a (raw) product a step closer to the form in which it can conveniently meet the need(s) of the user(s) or any improvement made to agricultural produce to bring it to a form in which the consumer wants it (Ngore,2010).

In recent years, the pro-poor growth approach has become one of the key concerns of developmental organizations. The focus of the approval lies in the promotion of economic potentials of the poor and disadvantaged groups of people (OECD, 2006). The main aim is to enable them to react and take advantage of new opportunities arising as a result of economic growth, and thereby overcome poverty (Berg & Kumbi, 2006). Value addition is useful as a poverty-reduction tool if it leads to increase on and off-farm rural employment and income. Increased agricultural productivity alone is not a sufficient route out of poverty within a context of globalization and increasing natural resource degradation. A focus on post-harvest activities, differential value added products and increasing livelihood with access to market for goods produced by low-income producers would appear to be the strategy open to smallholders (Lundy, *et al.* 2002).The poverty reducing potential of value addition is not only in generating rural income and employment but also

complemented by improvements in processing that reduce traditional food preparation times.

In recognition of the importance of the agricultural sector in Nigeria, the government has initiated and endorsed many national and international projects, programs and policies aimed at increasing farmers' income, supporting livelihood activities and thereby reducing poverty. Laudable among these programs is the National Fadama development programme. Fadama is a Hausa word for an irrigable land usually flood plains with shallow aquifers found along Nigeria major river system. Such lands are especially suitable for irrigated production, fish farming, traditional fish feed and water for livestock. (Ingawa, *et al.* 2004; Nwachukwu & Onyenweaku, 2007). The Fadama I project focused basically on crop production through supplementary water supply which resulted in conflict amongst common resource users. Fadama II project was implemented to address the problems identified in Fadama I by involving all the stakeholders in the common resource utilization and some downstream activities such as value addition and marketing were equally implemented. Fadama III project is a follow up to the Fadama II which is now implemented in 36 states and Federal capital territory (FCT). The National Fadama Development project is a major instrument for achieving Government's poverty reduction objective in the rural areas of Nigeria. Its beneficiaries are the private economic agents who achieve their livelihood directly or indirectly from the exploitation of the natural resources in a given Fadama area. The project empowers Fadama Community Associations (FCAs) with the resources and the needed training cum technical assistance and support to properly manage and control these resources for development. Fadama adopts a community demand-driven

(CDD), socially inclusive and participatory process whereby users of the Fadama collectively identify their development priorities and agree on their intervention activities outlined in Local Development Plans (LDPs) (National Fadama Development office, 2010).

Imo State is among the states that benefited in both Fadama I and II and presently in Fadama III whose development objective is to increase the incomes of users of land and water resources on a sustainable basis. It also seeks to reduce conflict among users and aims to address some factors that militate against the full realization of the potential benefits of agricultural production activities- poor development of infrastructure, storage, processing and marketing facilities (National Fadama Development Office; NFDO, 2010). Consequent upon the lessons learnt from NFDPI, the Fadama II and III project injected a lot of innovations, which includes that participation was not limited to Fadama crop farmers, but extended to all the users of Fadama resources-pastoralist, hunters, fisher-folks, vulnerable and marginalized groups among others. Fadama I was implemented in three local government areas of the State, while Fadama II was implemented in eleven local government areas, and presently Fadama III is being implemented in twenty local government areas out of twenty seven local government areas of the state. Local Fadama desks were established and operational in these participating LGAs in the State.

## **1.2 Statement of the problem**

In Sub-Saharan Africa, reliance on agriculture tends to diminish continuously as income level rises, i.e. the more diverse the income portfolio the better-off is the rural households. Elsewhere, a common pattern is for the very poor and the comparatively well off to have the most diverse livelihoods, while the middle ranges of income display less diversity (Ellis, 2000). It is widely agreed that a capability to diversify is beneficial for households at or below the poverty line. Having alternatives for income generation can make the difference between minimally viable livelihoods and destitution. However, diversification does not have an equalizing effect on rural incomes overall. Better-off households are typically able to diversify in more favourable labour markets than poor rural households. The tendency for rural households to engage in multiple occupations is often remarked, but few attempts have been made to link this behavior in a systematic way to household income generation. In the past it has often been assumed that farm output growth would create plentiful non-farm income earning opportunities in the rural economy via linkage effects. However, this assumption is no longer tenable; for many poor rural families, farming on their own are unable to provide sufficient means of survival, and the yield gains of new technology displays signs of leveling off, particularly in those regions where they were most dramatic in the past.

Nigeria, with a population of over 140 million, is Africa's most populous country and the continents fourth largest economy (NPC, 2006). The economy is still basically agrarian, but since the advent of petroleum in the mid-1970s the relative share of agriculture which was 65.5 percent in 1960/61 (with the agriculture subsector

accounting for 56.6 percent), has declined with the agricultural subsector accounting for only 32 percent per annum in the 1990s, (Oluwatayo, 2009). However, the sector still constitutes the source of employment and livelihood for about three quarters of the population and it is also the dominant activity in terms of linkages with the rest of the economy. The patterns of diversification and changing income levels indicate that agriculture is not a path out of poverty in many areas.

In a case study of a Cocoa production area in Nigeria, for example, household Rural Non-farm Income (RNFI) rose on average from 33% in the mid-80s to 57% in 1997, with the poorest households showing the strongest move towards RNFI over the period (Mustapha, 1999). Livelihood strategies are therefore likely to be influenced by relative income levels and in particular the number of options that become available to different income classes (Ellis, 1999). While recognizing the urgent need to maintain a robust agricultural sector, it is increasingly becoming clear that the agricultural sector alone cannot be relied upon as the core activity for rural households as a means of improving livelihood and reducing poverty. One phenomenon that is gaining prominence in the rural development literature is the promotion and support for non-farm diversification opportunities (Stifel, 2010).

Despite the plethora of poverty reduction strategies adopted in Nigeria like National Fadama Development Program, the poverty incidence in the rural areas of the country still remain high (HDR, 2006, 2007 (2008). The reason for this may not be farfetched. It may be because the common view on rural poverty reduction in Nigeria has been that of a sector driven almost entirely by production of crops and livestock; hence

there is need to reconsider the potentials of livelihood diversification within the Nigeria rural economy. Several studies (Marter, 2002; Matshe & Young 2004; Serra, *et al.* 2005; Kijima, *et al*, 2006; Haggblade, et al. 2007; Jan, et al, 2009) reported that livelihood concept and diversification of income help in minimizing household income variability, providing an additional source of income and even employment which have implications for rural poverty reduction and contribute substantially towards improving households' welfare. Inspite of the existence of projects like National Fadama Project that support value addition,farm households in the state carry out limited value addition and hence lose margins and jobs that could be created if they added value to their products.

Government through her agricultural transformation agenda has continued to emphasize the need for farm households to add value to their farm produce inorder to enhance their income generation, yet most farmers have continued to sale their produce without adding value. Also other factors that hinder value addition to farm produce need to be determined inorder to comprehensively address constraints to value addition and hence spur rural development.Besides, an understanding of the significance and nature of farm and off-farm activities (especially its contribution to rural household income) is of utmost importance for policy makers in the design of potent agricultural and rural development policies. Further, the rising incidence of low level of welfare of farm households in Nigeria and Imo State in particular, that remains unabated despite various policy reforms undertaken in the country, requires a deeper understanding of the problem and the need to proffer solutions to the problem

through approaches that place priority on the poor and ways on which farm households through diversification can maintain their livelihood.

This study therefore seeks to provide an in-depth understanding of the different livelihood activities that Fadama and non-Fadama households in Imo State engage in to generate incomes and also examine the contribution of livelihood diversification and value addition to household income of Fadama and non-Fadama users.

### **1.3 Objectives of the Study**

The broad objective of the study is to analyze livelihood diversification strategies among Fadama and non Fadama users in Imo State, Nigeria

The specific objectives are to:

- i. examine the socio-economic characteristics of Fadama and Non-Fadama users,
- ii. identify the income generating activities and their income share (farm and non-farm) engaged by Fadama and non-Fadama users in the study area,
- iii. determine the household income, its determinants and distribution among Fadama and non-Fadama users in the study area,
- iv. determine the forms of value addition and associated income among Fadama and non Fadama users,
- v. identify the areas of value addition on fadama activities in Imo State,
- vi. determine the extent of value added in fadama activities in Imo state,
- vii. analyse the determinants of household livelihood diversification strategies among fadama and non- fadama users, and

viii. determine the effects of household socioeconomic characteristics on value addition of Fadama and non- Fadama users.

#### **1.4 Hypotheses of the study:**

The following hypotheses are tested in this study;

- i there is no significant difference between Household income of Fadama and non-Fadama users in Imo state.
- ii socio-economic factors (household size, gender, age, educational level, extension visit, cooperative membership and farm size) of Fadama and non Fadama users have no significant influence on their household income.
- iii there is no significant difference in the livelihood diversification strategies of fadama and non fadama users in the study area.
- iv socio-economic characteristics (household size, gender, age, educational level, extension visit, cooperative membership and farm size ) of Fadama and Non Fadama users have no significant influence on their value addition.

#### **1.5 Justification for the Study**

This study will yield information on the income generating activities. Practically this information would be vital in identifying appropriate intervention, which can enhance the capacity of farm households and make them more secure. Indirectly this will contribute to the attainment of one of the Millennium Development Goals (MDG)- eradication of extreme poverty.

The result of this study will also help in understanding the household income and the factors affecting such income. Since one of the project development objectives

(PDOs) of Fadama Project is to sustainably increase the income of users, this finding would help to ascertain the contribution of Fadama in income generation among users and when compared to non-users would guide donor agencies, Government and non-Government organization to form opinion.

Data that would be generated by this study will be a valuable tool to advance the role of donor assisted projects in sustainable livelihoods in Nigeria. It would also be expected to be of help to development institutions and development workers to review their development strategies, so that they can address the needs and problems of farming households. The identified diversity of livelihood strategies will increase our understanding to how farm households survive.

The information will also help to build a balanced picture of farm households as they struggle to adjust to the livelihood challenges they face. Information generated by this study would indicate the extent to which livelihood diversification strategies affect farm and off-farm income. These findings will guide policy makers and development planners who are concerned with poverty alleviation while designing agricultural projects within the zone and elsewhere in the country.

This study will also generate information that would expose the constraints that need to be addressed to facilitate value addition in order to help farm households enhance their income generation as well as creating employment opportunities. The result of this study will also help to focus efforts to promote value addition to areas that farm households consider to be important.

The result will be expected to lay a benchmark for study on the situation of participation in Fadama projects. It will also serve as a source of information for

assessing the performance and impact of the project in the state and equally stand as a reference cum useful guide for the next phase of this programme. The study will further generate data and information that would encourage participation and also expose linkage opportunities to potential partners, credit agencies, and non-government organizations etc. of the projects.

The result of this research is expected to achieve similar outcomes in the long run when adopted by policy makers, sectoral planners and the government at various levels.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Conceptual Literature**

There are a number of definitions of livelihoods that have been put forward. Examples include; Chambers (1989) who defined livelihood as “adequate stocks and flows of cash to meet basic needs”. This was later expanded by Chambers and Conway (1992) who described livelihood as the capabilities, assets and activities required for a means of living. Though this definition does not clarify how these adequate stocks and flows of cash come about, Ellis (2000) in attempt to bring together various definitions defines livelihood as: “A livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household.” According to Reardon (2000) Livelihood generally means household and community behaviour with respect to holdings and use of assets and productive activities to which the assets are applied.

More elaborately, Carney states that a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living”. This definition of livelihood has been followed by many academic and development practitioners (Carney, 1998; Scoones, 1998; DFID, 1999; Muray, 2001; Bhandari and Grant, 2007). In their work, Niehof and Price (2001) defined livelihood in terms of a system, which can be conceptualised as having inputs (resources and assets), output or livelihood, purpose (livelihood adequacy for meeting basic need),

activities (livelihood generation and the composition of the livelihood portfolio), agency (efforts of households and individuals to achieve livelihood adequacy), quality (degree of vulnerability or sustainability of the livelihood, environment (context within which the livelihood system interfaces with other systems and institutions) and the locus which is the household). The livelihood of a household at its most simple form can be seen as “the means that the household uses to achieve well-being and sustain it” (Messer & Townsley, 2003). Despite the many definitions of livelihoods available, the most widely accepted definition of livelihood is that propounded by Chambers and Conway (1991): “A livelihood comprises the capabilities, assets and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; which contributes net benefits to other livelihoods at the local and global levels and in the short and long run”.

From the definition, a livelihood will encompass both cash and in kind income, social institutions (kin, family, and community networks), gender relations and property rights required for sustaining a given standard of living. Social networks are important for facilitating and sustaining diverse income portfolios. This does not exclude access to, and benefits derived from, social and public services provided by the state such as education, health services, roads, and water supplies etc. which also constitute livelihoods (Ellis, 1998). In summary, a livelihood comprises capabilities, material and social resources and activities required for a means of living which also takes into

account the role played by structures, policies and processes in influencing the choice of livelihood strategies by the rural poor. It is considered sustainable when it can cope with and recover from stresses and shocks maintain or enhance its capabilities and assets, while not undermining its natural resource base (Scoones, 1998, Carney, 1998, Kanji, Macgregor, and Tacoli, 2005). Taken together, these definitions reveal that the term livelihoods is a multi-faceted concept referring to what people do to make a living with the assets at their disposal and what they accomplish by doing it in a particular context (Niehof, 2004). The concept of livelihood is therefore about individuals, households or communities making a living, attempting to meet their various consumption and economic necessities, coping with uncertainties and responding to new opportunities (de Haan and Zoomers, 2005). Besides, it is a holistic approach that embraces various aspects of human existence, (Mitchel, 2011).

A livelihood strategy would include activities that generate income to a household. It not only captures what people do in order to make a living, but also resources that provide them with the capability to build a satisfactory living, risk factors they consider in managing their resources as well as the institutional and policy context that either helps or hinders them in pursuit of an improved standard of living. The term capabilities according to Sen (1993) and Ellis (2000) refers to the ability of individuals to realize their potential as human beings, in the sense of both being (that is, to be adequately nourished, free from illness) and doing (that is, to exercise choices, develop skills and experience). The FAO guidelines for livelihoods (Messer & Townsley, 2003) emphasized that livelihoods are not limited to “the activities that

people carry out to earn a living” but constitute all the aspects that affect their ability to ensure a living for their household. This follows from Bebbington’s argument (1999) that capital “are not simply resources that people use in building livelihoods: they are assets that give them the capability to be and to act”. Consequently, besides the conventional use of capitals to ‘make a living’, they can also make living ‘meaningful’. This study therefore, conceived livelihoods diversification strategies as a mechanism that the Fadama and non Fadama users had consciously adopted to ensure their survival and improve their standard of living as livelihood components that supported their livelihood had been altered.

### **2.1.1 Concept of Household Income**

A useful starting point for mapping agricultural household incomes and engagement in the wider rural economy is to consider the potential sources of income available to each farm household. It is often assumed that the main component of household income will come from agricultural activities, which can be defined as gainful activities relating to the primary production of food or fibre taking place on predominantly agricultural units (Osmani, et al. 2010). In addition to agricultural activities, a household may engage in off-farm employment and/or off-farm self-employment. These can be labelled employment and enterprise diversification respectively. Households may also receive transfers that may come from the government (pensions, social security) or private individuals. (Osmani *et al*, 2010). Remittances tend to be the most important form of private transfers. Engagement in other activities to sustain or improve farm household income is not a novel strategy and for very small farms, the necessity of additional off-farm income has been a

historically continuous feature. However it is only more recently that policymakers have specifically sought to stimulate enterprise and employment diversification (Davis *et al.* 2010). This contrasts with much of the ‘agricultural modernization’ approach which focused on specialization and farm amalgamation (Ellis, 2000). Engagement in other activities has been promoted to improve both the welfare of farm households and stimulate the wider rural economy (Reardon, 1997; Davis *et al.* 2010). In the rural area, the majority of households are involved in farm activities but many of them get their income from non-farm activities (World Bank, 2008). Thus, in the rural area, it is hard to find peasants who do only farming. As a matter of fact, households devote part of their time to farm activities and part of it to non-farm ones. Surveys carried out in several countries have indicated that between one third and two thirds of farmers reported that they were involved in a non-farm activity as well (Kimhi, 2000). The growth of the farming sector activities provides opportunities to the non-farm sector. In situations where there are no credit constraints, the non-farm income becomes a determinant in the rural households’ strategy for farming investment. The growth of non-farm activities can ease the constraint on credit and liquid assets required for agricultural production and can boost agricultural competitiveness (World Bank, 2008).

In many developing countries, and particularly in Africa, agricultural income represents an essential component of rural households’ subsistence. However, this type of income exhibits a high seasonality and leads to uncertain outcomes, because of market prices volatility and environmental hazards. Consequently, household members partly allocate their working time to activities which provide a more stable

income so as to cope with adverse shocks. The contribution of these activities to household income in the developing world in general and sub-Saharan Africa in particular is substantial. While agricultural related activities still constitute the largest share of total income among rural households, a number of empirical studies show the growing importance of RNF activities in developing and transition countries. Surveys of studies indicate that RNF income represents on average 42% of rural income in Africa, 32% in Asia, 40% in Latin America and 44% in Eastern Europe and the CIS (Davis, 2004; FAO, 1998; Reardon, et al. 2001). Aggregate statistics on the non-farm economy reported by Lanjouw and Feder (2001) confirm this range of results for RNF employment across countries. These studies also suggest the RNF economy is expanding and is likely to continue to increase its share of total rural income in the future. While available data indicate the importance of the RNF economy in general, there is considerable variation across countries. For Latin America and the Caribbean, estimates of RNF income shares for rural households range from 22% in Honduras to 59% in nearby Costa Rica and 68% for Haiti (Reardon *et al.*, 2001). For Africa, estimates range between 15% for Mozambique to 93% for Namibia (Reardon, 1997). Even more recent data for Eastern Europe and the CIS indicate a range from 31% in Armenia and 68% in Bulgaria (Davis, 2004). Haggblade, Hazell, and Reardon, (2010) observe that non-agricultural income contributes between 30 to 45 per cent of rural household incomes in the developing world. Reardon et al. (1998) put this share at 42 per cent for sub-Saharan Africa, while Reardon (1999) gives estimates of 32 per cent and 40 per cent for Asia and Latin America, respectively. Ellis (2000) reports somewhat higher figures from case studies in sub-Saharan Africa in a range of 30 to

50 percent. Local non-farm activities are often pursued through self-employment, but there is also a non-agricultural wage labour market, although this market is typically small in the rural sub-Saharan African context. Significant amounts of money and in-kind transfers are remitted by international and internal migrants. International remittance flows to developing countries made up 167 USD in 2005 (World Bank, 2006). The figure for Ghana indicates an inflow of 99 million USD in 2005 (World Bank (1), 2007). Internal remittances also constitute a big share of household income. Cox and Jimenez (1990) review studies on private inter-family transfers in developing countries. They find that 20-90 percent of households in developing countries receive private transfers, comprising 2-20 percent of household income. In the same time frame only 15 percent of households in the United States received such transfers, comprising only 1 percent of household income on average.

Farm households, however, do not live on farming alone. Parallel to the developments in agricultural science, the view on rural households has changed in the past decades. Analyses of single production systems have given way to a view on rural households as diversified enterprises (Marijk *et.al*, 2007). Rural household enterprises are not limited to the agricultural sector. Non-farm activities play an important role in income of these households all across the world, even in regions commonly thought of as subsistence oriented, such as Sub-Saharan Africa. Given the existence of both low and high return RNF activities, and the different predisposition by households to overcome barriers to entry, previous empirical studies have shown a wide variety of results in terms of the relationship of RNF activities to poverty. Part of the ambiguity of the available findings derives from methodological differences. Older studies reviewed in

FAO (1998) found a higher share of RNF income among poorer rural households in Pakistan and Kenya and a higher share among richer households in Niger, Rwanda, Mozambique and Vietnam. More recently, Lanjouw (1999) and Elbers and Lanjouw (2001) for Ecuador, Adams (2000) for Jordan and Isgut (2004) for Honduras find that the poor have a lower share of income from RNF activities than the non-poor, while Adams (2002) finds the opposite for Egypt. De Janvry, Sadoulet and Zhu (2005) find that RNF reduces poverty in China, and particularly the severity of poverty, and that RNF activities have played a key role in falling poverty rates in China, as RNF activities provide an alternative to small landholdings. In their study of India, Lanjouw and Shariff (2002) find that the importance of RNF activities by income level varies by state. For those states with a high share of income from RNF activities, the shares are greater for better-off households; for those states with a lower share of income from Rural Non Farm activities, the opposite is true. This stems in part from the type of Rural Non Farm activities associated with poverty status. The share of income from casual wage employment is highest among the poor, while the share from regular wage employment is highest among the rich.

According to the literature, rural households have various motives for diversifying their income sources and generation patterns instead of concentrating on agriculture with its potential gains from specialisation. Economic theory concerning the agricultural household and the household model consider diversification to be rational economic behaviour in terms of utility maximisation in a given environment of opportunities and constraints. Barrett, Reardon and Webb (2001) concluded from several studies that diversification to non-farm activities could be induced by

diminishing or time-varying returns on agricultural labour or on land, market failures, or the need to introduce risk management or coping mechanisms Ellis (1998) listed the following reasons for income diversification: the seasonal use of labour, differentiated labour markets, household-risk strategies and coping behaviour, credit-market imperfections, and household savings and investment strategies. Non-farm income can thus help in overcoming credit and insurance problems. It could also provide income-earning opportunities outside the growing season, employ the household's extra labour, help in managing weather and other risks, and ensure smoother consumption throughout the year. Islam (1997) argued that, in general, the primary reason for the growth in the rural non-farm (RNF) sector was the availability of surplus rural labour.

The causes of diversification could be categorised in terms of push factors, such as environmental risks and falling income, and pull factors, such as changing terms of trade or perceptions of improved opportunities (Hussein & Nelson, 1998). Gordon and Craig (2001) found that push factors such as external shocks could lead to large numbers of people being drawn into poorly remunerated low-entry-barrier activities, while the pull effect is likely to offer a route to improved wealth status through better-paid non-farm activities. In the absence of credit and insurance markets, the rural poor have to find other ways of spreading their consumption, and for many of them income diversification is a potential option (Barrett *et al*, 2001). Diversification should preferably take place across sectors, space and time in order to reduce income variability. However, many of the non-farm sources have been found to be closely

linked to agriculture. There are differing views as regards the importance and role of income diversification in the future. It is often assumed that the process of diversification will assume more importance and become more common in the future. According to Chambers (1995), “Individuals and families diversify and complicate their livelihood strategies in order to increase income, reduce vulnerability and improve the quality of their lives”. The potential roles of rural non-farm activities in poverty reduction is described by Gordon and Craig (2001): “Rural non-farm activities may absorb surplus labour in rural areas, help farm-based households spread risk, offer more remunerative activities to supplement or replace agricultural income, offer income potential during the agricultural off-season, and provide a means to cope or survive when farming fails.” Davis (2007) concluded that income diversification among rural households was the norm rather than an exception, basing his remarks on his study of 10 countries in four continents. Timmer (1997) linking income diversification to agricultural transformation and Kimenju and Tschirley (2007), who studied agricultural and livelihood diversification in Kenya, stated however, that with the advancement of agricultural transformation, there is a tendency from diversification towards increasing specialisation. Non-farm activities may be particularly important to women and poor families. Islam (1997) concluded that women’s involvement in the RNF economy strengthens their decision-making power within the family, helps to control the family size, and improves child nutrition and education. Women’s capacity to diversify is, however, largely dependent on their endowments and access to assets.

### **2.1.1.1 Measures of income diversification**

Empirical studies in this field have based their analysis on at least one of the following five definitions of income diversification.

First, this is the simplest definition and possibly closest to the meaning of the word. That is, diversification is referred to a process by which the presence of multiple income sources is created (Minot, et al. 2006). The number of income sources that each household has at a given point in time is used as a measure of income diversity while the difference in the number of income sources that one household has at different points in time indicates the level of income diversification pursued by that household over that corresponding period. Accordingly, households with more income sources are treated as households with higher levels of diversity in income and the greater the increase in the number of sources over time the greater the increase in diversification over time. This indicator, the number of income sources, has the advantage that it is simple to understand and provides an easily visible picture of income diversification. However, as the focus is solely on the number of sources, this conceptualization of income diversification treats every source of income equally instead of taking into account the importance of, or the income share from each of the sources. This is its main weakness and due to this, it is not widely used, or is used as a complementary indicator, in empirical studies in this field. In their study, Minot *et al.* (2006) employ this measure along with other measures to examine the patterns and determinants of income diversification among rural households in Vietnam. To overcome the above-mentioned weakness, an approach that takes into consideration both the number of income sources and the contribution of each source to total

household income may be used. In this conceptualization, income diversification is understood as a process in which households increase not just the number of sources but also achieve a greater balance in terms of the relative share of the various income sources in their portfolio (Ellis, 2000; Minot *et al.* 2006). This conceptualization is operationalized by using the following indices: the original Herfindahl index, the inverse Herfindahl index, and the Simpson index. Although the underlying idea of this approach sounds useful, these two dimensional indices are not able to reveal the type of diversification pursued by different households that have the same value of the indices or within a single household at different points in time. They are an inappropriate measure for any study in which understanding diversification into a given source, for example non-farm employment, is the central concern. Possibly, these disadvantages make the definition less preferred. Examples of research using this conceptualization include Ellis (2000), Joshi (2003) and Minot *et al.* (2006).

The third, and also the most widely used definition relates to nonfarm employment. At the household-level, income diversification is defined as a process in which rural households increase their employment and income from the non-farm sector (Barrett and Reardon 2001, Barrett *et al.* 2001, Davis & Bezemer 2003, Ellis 2000, Lanjouw & Feder 2001). Regarding this, either the share of time spent on or the share of earnings from non-farm activities is used to highlight the importance of non-farm income in a household's livelihood. A number of papers have adopted this conceptualization including Ellis (2000), Escobal (2001), Abdulai and CroleRees (2001), van de Walle and Cratty (2004) and Minot *et al.* (2006).

A fourth definition of income diversification refers to commercialization. In the words of Minot *et al.* (2006), “a less ambiguous term is agricultural commercialization” and that “is sometimes defined as the process of switching from subsistence production of staple crops to commercial production of a wider range of agricultural commodities and to non-farm activities.” With this conceptualization, income diversification is referred to in terms of the level and change over time in the proportion of home produced agricultural product that is sold. This measure is useful as it provides a sense of the level of market integration and is an outcome of farmers’ production and sales decisions. However, it does not provide a complete portrait of income diversification in rural areas where there are a number of households who are not farmers and whose earnings are solely from non-farm employment.

Finally, income diversification is used and defined by Minot *et al.* (2006) as “the process of switching from low-value crop production to high-value crops, livestock, and non-farm activities”. The distinction between “high value” and “low value” is based on the net revenue per hectare or per day of labour from each of the activities undertaken by rural households. This criterion can be viewed as an extension of the use of “labour productivity” or “capital productivity”. The underlying argument for this approach is that “high value” options are more likely to be used by better-off than worse-off households, while the opposite pattern is expected for “low value” options.

### **2.1.2 The Concept of Value Addition**

Value addition refers to the act of adding value(s) to a product to create form, place, and time utility which increase the customer value offered by a product or service. It is an innovation that enhances or improves an existing product or introduces new products or new product uses (Fleming, 2005). Income growth, urbanization, and technological advances, along with ever expanding global trade in agriculture, have contributed to a growing global demand for processed products with added values (Berhanu, et al. 2011). The emerging trend for processed agricultural products in the global market creates opportunities for smallholder farmers in the developing countries to benefit from such opportunities by linking their activities to value chains through vertical and horizontal linkages (Vermeulen, et al. 2008). Promoting value addition to agric products is believed to be useful for poverty reduction through creating income generating opportunities to the rural poor. In addition to serving as mechanisms in generating income, value added products are potential avenues to minimize losses and increase storage life.

Value addition is a very crucial aspect of agriculture today. Producers are now focusing on downstream activities and attempting to form producer alliances and value added cooperatives to capture some of the margin from further processing, this is because value addition has turned out to be the only way to participate in ‘new agriculture’ Boehlje, et al. (2002). Punjabi (2007) observed that it has become clear worldwide that the most rapid growth in agriculture has been occurring on the part of post-production activities. This is being driven by growth of middle income consumers even in low income countries and their demands for better quality value added products. Absence of agro-industry and agribusiness resulting in low levels of value addition of agricultural

commodities has been one of the main causes of stagnation in rural incomes. A substantial agribusiness sector generating a high outflow of value added commodities is always correlated with high agricultural GDP and high rural incomes.

According to Brewin, et al. (2009), firms that conduct both process and product innovations in-house are better able to enjoy complementarities that arise in the discovery process. They also found that firms were more likely to innovate in response to keeping pace with competitors. Omitti, et al. (2007) ; Okali, et al (2009) have argued that value addition (among other things) in rural agriculture should be enhanced in order to promote market oriented smallholder agriculture in the developing countries; hence agribusiness has been identified as the best avenue to channel credit into agriculture, and hence promote value addition (Stanton 2000).

The focus of this study on this aspect therefore, was to determine the factors that influenced extent of value addition among Fadama users and the effect of socio economic characteristics on value addition among Fadama and non fadama users in the study area.

### **2.1.3 The Concept of Fadama**

Irrigated agriculture is now the most productive farming system that is widely practiced. It is also one of the most expensive (FAO, 1992). Fadama farming is a typical form of irrigation farming. Singh (1997) however contends that in agricultural usage, the word Fadama refers to areas close to rivers, depressed or adjacent to streamliner, due to its characteristic moisture retention within or very close to the rhizosphere for greater part of the year.

Fadama -The Hausa name for irrigable land are flood plains and low-lying area underlined by shallow aquifers and found along Nigeria's river system (Ingawa et al, 2004; Nkonya, et al. 2008; Blench & Ingawa, 2004; Ezeh, & Nwachukwu, 2010). World Bank, (2001) defined Fadama as river valley areas which are seasonally flooded or have high water tables for all, or a large part of the year. They are composed of deposited sediments and contain exploitable aquifers (Cochita, 1998). Fadama also refers to a seasonally flooded area used for farming during the dry season. It is defined as alluvial, lowland formed by erosional and depositional actions of the rivers and streams (Qureshi, 1989) the encompass land and water resources that could easily be developed for irrigation agriculture (World Bank, 2010). Fadama are typically water logged during the raining season but retain moisture during the dry season. The areas are considered to have high potential for economic development through appropriate investments in infrastructure, household's assets and technical assistance. When Fadama spread out over a large area, they are often called "wetlands".

Wetlands are recognized by the RAMSAR convention (Ramsar is a place in Iran where the convention was signed) and it is of worldwide significance because of the biodiversity they support. Nigeria is a signatory to this convention. The Ranasar convention of 1971 defined wetlands as areas of Marsh, Fen, Peat or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres. In addition, these are human made wetlands such as fish and

shrimp ponds, farms ponds, irrigated agricultural lands, salt pens, reservoirs, gravel pits, sewage farms and canals (Anon, 2004).

The lessons learnt from the relatively poor performance of River Basin Development Authorities (RBDAs) has made Agricultural Development Programmes (ADPs) to develop sustainable Fadama lands through small-scale, farmer-managed and cost effective irrigation schemes with farmers participation. Fadama is a household name in the Northern part of the country. In the Southern part of Nigeria, it is relatively less understood. It did not start at the same time in the South as it did in the North. This is mainly due to the more favourable endowments of the North. The project favours large scale cultivation which is practiced more in the North than in the South. Moreso, there are many low-lying water (aquifers) in the North than in the south. The take off of Fadama in the North was in addition occasioned by the fact that seasonal rainfall in the North was inadequate to sustain the large scale potentials of agricultural activities in the region.

The first set of states where Fadama project took off was regarded as the core-beneficiary states. They were Northern States of Kano, Sokoto, Bauchi, Jigawa, Kebbi, Zamfara and Gombe (Cochita, 1998).

Imo State was a facilitating state added when the phase 1 of the project (1993–1999) was about to end. The other four States in the South-East entered in 2008 after satisfying eligibility criteria.

To qualify, the State satisfied the following eligibility conditions as outlined by Umar, *et al* (1994):

- (a) Formation of Fadama User Groups (FUGs), Fadama Community Associations (FCAs), State Coordination Office manned by qualified and experienced Project Implementation Unit (PIU) staff as well as local desk offices at local government areas;
- (b) Completion of water resources survey including shallow ground water;
- (c) Training of procurement officer;
- (d) Participation of the ADP staff in training programme of Fadama development organization by Programme Coordinating Unit (PCU);
- (e) Preparation of an environmental sustainable management plan.
- (f) Signing of Subsidiary Loan Agreement; and
- (g) Payment of counterpart contribution by State and Local Government Areas.

Reports on previous small-scale irrigation schemes contend that they recorded huge success. For instance Olugbemi (1989) indicated that between 1983 and 1988, a targeted 5,000 ha of small Fadama development scheme was exceeded by 9,000 ha resulting in 14,000 ha. The report of Baba (1993) showed that Fadama has the potential to meet the food self sufficiency and food security of the country.

#### **2.1.3.1 FADAMA I**

The National Fadama Development Programme (NFDP) was designed to assist some states of federation through the World Bank supported Agricultural Development Programme (ADP) net work to, among others. Finance the provision of shallow tube wells in Fadama lands for small scale irrigation, simplifying drilling technologies for shallow tube wells constructing Fadama infrastructure, organizing Fadama farmers for

irrigation management, cost recovery and better access to credit, marketing and other equipment (Ayanwale & Alimi, 2004).

Fadama I focused on crop production and largely neglected support of post production activities such as commodity processing, storage, and marketing. The emphasis of Fadama I was on providing boreholes and pumps to crop farmers through simple credit arrangement aimed at boasting aggregate crop output. Fadama I worked with Fadama Users Associations, which the states used mainly to recover loans and to decide on water infrastructure locations. FadamaI became effective on February 23, 1993 and closed in March 1999. It built on the achievements of Northern ADPs in developing small scale irrigation through the extraction of shallow ground water with low cost petrol driven pumps. It was funded with the sum of USD67.5million. FadamaI reduced the dependence of agricultural production on erratic rainfall thereby increased the incomes of the beneficiaries. It was practiced in few States of Northern Nigeria. The successes recorded in Fadama I led to the introduction of Fadama II in May 2004 in eighteen states of the federation with increased funding envelop of USD100 million.

### **2.1.3.2 FADAMA II**

Fadama II was first implemented in 2004 and operated in 18 states, 10 of which were Fadama I states (Bauchi, Kebbi, Niger, Benue, Imo Taraba, the Federal Capital Territory [FCT], Ogun, Oyo, and Lagos). Fadama II addressed the shortcomings of Fadama I by shifting from a top-down and supply-driven public sector development program to the community-driven development approach. The design of the Fadama II project met all the key features of a CDD project. Consistent with the CDD approach,

project activities was centered on Fadama User Groups (FUGs) and Fadama Community Associations (FCAs). An FUG comprises *Fadama* users with a common economic interest and is therefore a type of economic interest group. FCAs are the associations of FUGs operating in a given area. Each FCA designed and oversaw the implementation of a Local Development Plan, which is the blueprint of the Fadama II development project in that FCA. The major productive sectors that Fadama II supports include crops, livestock, agroforestry, fishing, and fish farming (fisherfolk).

Addressing one of the weaknesses of Fadama I, Fadama II also supported postproduction activities that are closely linked to the project's productive activities. These included agro processing enterprises and rural marketing service providers. As part of its targeting strategies, Fadama II provided special preferences to groups of youth, women (especially widows), physically challenged persons, the elderly, and people with HIV/AIDS. Targeted groups can belong to any of the productive or service sectors supported by the project. Because the Fadama II used the CDD approach, beneficiaries were given the chance to choose the kind of activities they want to pursue. However, there were some activities that the project did not support, such as activities that could lead to degradation of natural resources or large-scale changes in land use (NFDO, 2005). Under the CDD approach of Fadama II, all users of *Fadama* resources were encouraged to develop participatory and socially inclusive local development plans. The 12 states that benefited under the World Bank–assisted aspects of Fadama II were Adamawa, Bauchi, Gombe, FCT, Imo, Kaduna, Kebbi, Lagos, Niger, Ogun, Oyo, and Taraba. the remaining 6 states (Pleateau, Kogi, Kwara, Jigawa, Katsina and Borno) benefited under African Development Bank.

Fadama II was designed to operate for five years (2004–2009) with a goal of contributing to poverty reduction in Nigeria.

Actual implementation did not begin until September 2005. However, the project set a target of 50 percent of male and female *Fadama* resource users who benefit from the project-supported activities achieving an increase in average real income by at least 20 percent compared with the baseline.

### **2.1.3.3 FADAMA III**

Fadama III is a nationwide 5 year programme that covers 19 new states and the 12 states that participated in the FADAMA II project. It also includes 6 AFDB states. In each of the beneficiary state, 20 Local Government Areas are picked to participate while 10 Fadama Community Associations (FCAs) are incorporated into the project from each Local Government. In actual terms, this project targets 2.2 million rural farming households of approximately 16 million members. This represents over 10% of the national population with the target groups including farmers, pastoralists, fisher folks, trades, processors, hunters and gatherers as well as the disadvantaged and physically challenged groups. Furthermore, vulnerable groups, service providers, private operators and government agencies are also among the target population of this project.

Departing from the old concept of top to Bottom decision making, the project embraced a proactive Bottom to Top Community Driven Development Approach which puts beneficiary communities and stakeholders' in the drivers, seat. Under this concept, projects are identified and implemented by communities based on the

peculiar needs and demands while the project coordination offices merely serve as facilitators. Put in other words, the project provides supports to FADAMA III activities that are related to:

1. Formation of viable Fadama User Groups (FUGs) and Fadama Community Associations (FCAs).
2. Promotion of Groups – owned Productive Assets such as Cereal Mills, Rice Mills, Cassava Processing Plants, Water Pumps, Ox-drawn implements, mini-tractors and power tillers among others.
3. Provision of input support for production, processing and marketing along the value chain.
4. Empowering participants with best agricultural practices and advisory services in areas of demand.
5. Rehabilitation of rural infrastructure and construction of feeder and access roads, culverts and bridges, rural markets, water points, small earth ponds and dams.
6. Sustainable land and water management practices and structure
7. Creation of form for conflict resolution among Fadama Resources Users.
8. Support to Agricultural Development Programmes (ADPs) and to help the ADPs build agricultural data bank through Monitoring and Evaluation (M&E).
9. Contribution to National Agricultural Market Information Systems so that farmers can access market information nationwide.

Added to this is the fact that the project concept revolves around a major departure from subsistence to commercial agriculture with its attendant socio-economic benefits

to host communities, the Local and State levels environments as well as to the nation's GDP.

However, the Federal Ministry of Agriculture and Water Resources is the overall body for the project execution. The National Fadama Development Office is the coordination agency for FADAMA III project nationwide while the State Fadama Coordination Offices in beneficiary states oversee activities at the state levels. All the 10 Fadama Community Associations (FCAs) selected from each of the 20 Local Governments of the 12 Fadama II and the 19 new FADAMA III states as well as the AfDB States are within the project scope and thus qualify as participants/beneficiaries. As earlier pointed out, a major character of this project is its Demand Driven Decentralized Community Decision making approach. To make it much more efficient, effective and successful, five innovative features have been embedded in the project and they are as follows:

The first is the introduction of Capitalization Revolving Fund Scheme Fadama User Equity Fund (FUEF). This requires 30% upfront contribution by a beneficiary which qualifies it for 70% matching grant for the acquisition of productive assets. A fallout of this innovation is that it also allows the setting aside of a percentage of the profit for replacement of the productive assets and saves recovered funds in the Revolving Fund Scheme for ownership FCAS and FUGs.

The second in the innovations is the provision of 50% matching grants on inputs as against credit facility. This applies in the first 2 years of the project life. Also, 100% matching grant is provided to vulnerable groups for the acquisition of inputs as well as productive assets. For the vulnerable groups, only 15% repayment of the sum

advanced is required from the proceeds of their activity. Next in the innovations introduced by the project is support to ADP sponsored research and on-farm demonstration. The objective of this is to help deliver adequate and timely advisory and extension services.

In order to help the institutionalization of Community Driven Development process by Local Governments as well as to put in place decentralization of decision making at both local and community levels, the projects also provides capacity building programmes – most especially to participating Local Government Council Staff. The highlight of this innovation can be seen from the fact that it is only through efficient capacity building that the entire stakeholders in the project would come to appreciate the benefits of the Community Driven Development Approach.

Being a Bottom to Top Model, the FADAMA III project comprises of a Small Scale Community Owned Infrastructure (SCI) component. In practical terms community owned facilities are better managed, used and protected because every community members has a stake in it. To support this concept therefore, the Project encourages beneficiary communities to prioritize their needs and prepare Local Development Plans for funding. For emphasis, it should be remembered that these grants are disbursed only to Fadama Community Associations and in tranches.

Meanwhile, the actual objective of support to these SCIs is to help communities benefit from Productive rural Infrastructures, provide better systems of marketing of agro pastoral produce and to ensure environmental compliance and mitigation measures.

In specific terms the subprojects to be financed through the grants provided to Fadama Community Associations (FCAs) by the project target the following areas.

**A    Rural Roads Rehabilitation or Construction.**

- Rural Feeder Roads.
- Fadama Access Roads
- Small Bridges/Culverts (Single, Double or Multi-ring or Box Types).

**B    Rural Markets**

- Open or lock-up stalls with VIP latrines for males/females, boreholes; other water facilities and drainage.

**C.    Small Scale Irrigation Scheme of 1-5 hectares**

- Low cost irrigation systems using tube wells or wash bores or perennial streams and rivers.
- Mini water scheme i.e. borehole/deep well, overhead tank, generator/gen house, battery of taps.

**D.    Water Harvest Structures such as small earth or rock filled dams, weirs etc.**

On the whole, the subprojects supported by the project are classified as single FCA subprojects which fall within the range of from \$1000 to \$10,000 and Cross FCA subprojects which cover \$10,000 to \$35,000. While the former refers to subprojects within an FCA, the latter as the name implies refers to activities that cut across or are beneficial to two or more project beneficiaries.

### **2.1.3.3.1 Financing Plan**

The financial plan for the Fadama III phase for the period of five years is shown below

Table 2.1 Fadama III Financial Plan

The World Bank	USD 250M	55.6%
Federal Government of Nigeria	USD 23M	5.1%
State Governments	USD77M	17.1%
Local Governments	USD40M	8.9%
Communities	USD60M	13.3%
<b>Total</b>	<b>USD450M</b>	<b>100%</b>

Source: Fadama III Project Implementation Manual (PIM).

### **2.1.3.3.2 Project Objectives**

The project development objective is to sustainably increase the incomes of Fadama Users—those who depend directly or indirectly on Fadama resources (farmers, Pastoralists, Fisher folks, hunters, gatherers and service Providers)—through empowering communities to take charge of their own development agenda, and by reducing conflict between Fadama users. The project adopted a demand–driven approach. In this case, users of Fadama resources were encouraged to develop participatory and socially- inclusive local Development Plans (LDPs). The LDPs were the basis for support under the project.

### **2.1.3.3.3 Target Population**

Direct beneficiaries are the 2 million rural families living in the participating states now pursuing their livelihoods in the Fadama lands. These are not only farmers. A

significant aim of the project design was to ensure that the various Fadama User Groups learn to each other's rights to a common resource pool which they share and take individual decisions keeping in mind the impact such actions may have on others and on the Fadama environment at large. In the past, Fadama use has been dominated by sedentary farmers who are the majority group and also the most vocal and influential. A primary aim of this project was to ensure that other less dominant Fadama Users (Fisher folks, Pastoralists) and even marginal Users (hunters, gatherers) were recognized as Fadama Users and that their role in maintaining these lands are acknowledged and respected. Moreover, vulnerable sub- groups such as widows, elderly, etc. were targeted to ensure that they are beneficiaries of project- funded activities. Such an approach was aimed at avoiding situations of elite capture and conflict (formal and informal) - a primary obstacle to the success of the first Fadama Development Project (Ingawa *et al*, 2004).

#### **2.1.3.3.4 Project Strategy**

The basic strategy of the project was that of a Community- Driven Development (CDD) approach with strong emphasis on stake holder participation, especially at the community level. Facilitators supported under the project helped in organizing the Fadama Community Associations (FCAs) and guided them through an intensive process of group decision- making using a range of participating techniques, resulting in LDPs. In this manner, the project ensured that every activity funded by the project were conceived after informed discussion by the whole community, which resulted from consensus building and social inclusiveness (Ingawa *et al*, 2004). The Community- Driven Development (CDD) approach has become a major strategy used

by both government and development assistance programs (Gillespie, 2004; Mansuri and Rao, 2004; Platteau, 2004). The popularity of the CDD approach has been propelled by its potential to develop projects and programs that are sustainable and responsive to local priorities, empower local communities to manage and govern their own development programs, and more effectively target poor and vulnerable groups (Dongier *et al*, 2001; Gillespie, 2004). Empirical evidence of the effectiveness of CDD in achieving these objectives is mixed (Mansuri and Rao, 2004). Among the interesting questions capturing the attention of scholars are the sustainability of donor - supported CDD and its effectiveness in targeting the poor and vulnerable. Khwaja (2001) observed that projects managed by communities were more sustainable than those managed by local governments because of better maintenance. However, Cleaver (1999), Kleimeer (2000), and Mosse (1997) found that CDD projects that lacked external institutional, financial, and technical support were not sustainable. Targeting the poor has been one of the challenges of development and emergency response programs (Farrington and Slater, 2006). One argument in favor of CDD asserts that it can improve targeting because CDD projects make better use of local knowledge to define and identify the targeted groups (Mansuri & Rao, 2004). However, there has been mixed empirical evidence concerning the effectiveness of targeting using the CDD approach. One review concluded that in heterogeneous communities with high social inequality, the performance of CDD projects in targeting has been worse than that of externally managed programs (Conning and Kevane, 2002). However, the review also revealed that in egalitarian communities

with open and transparent systems of decision making, targeting was better with CDD than with development approaches using external project management.

#### **2.1.3.3.5 Project components**

The project designed the following five components to achieve its goal:

##### **2.1.3.3.5.1. Capacity Building**

This aims to increase the ability of its beneficiaries to assess their needs, participate in planning, and implement and manage economic activities, and to increase the capacity of the project coordinators to conduct monitoring and evaluation. Fadama III provides capacity building through trained facilitators. In addition, FUG members are trained to negotiate and manage contracts and to conduct basic financial analysis. Apart from capacity building support to Fadama Community Associations (FCAs) and Fadama User Groups (FUGs), the components inculcate skills and know– how in them to enable them to take charge of their development agenda.

##### **2.1.3.3.5.2. Rural infrastructure investments**

The Rural infrastructure component is responsible for the creation of economic infrastructure and local production methods in order to improve the productivity of Fadama User households. It finances the construction or rehabilitation of eligible small– scale infrastructural Projects, specified as priorities in Local Development Plans (LDPs) and also larger subprojects that cut across development plans which are considered priorities by the Fadama Community Associations. Such infrastructures include: Feeder roads, culvert, drift stock routes, grazing reserve and service centres.

Others are market infrastructure such as VIP latrine, drainages, boreholes, cold rooms, cooling sheds, rice processing, post - harvesting and maize processing equipment (Ingawa *et al*, 2004).

#### **2.1.3.3.5.3 Productive asset acquisition support**

The overall objective of this component is to enhance the improvement in Fadama Users' productivity and income by facilitating the acquisition of productive assets by individuals or Fadama User Groups (FUGs) to mobilize their own funds and by providing matching grants for income – generating activities (IGAs) to Fadama User Groups. The pilot Scheme will promote the acquisition of productive assets, and reduce the impact of market failures in rural finance sector on the poor Fadama User Groups through matching grants. A matching grant of Seventy percent (70%) will supplement the beneficiaries financing share of thirty percent (30%) of cost of the assets (Okonjo, 2005).

#### **2.1.3.3.5.4. Demand– responsive advisory services**

This component supports advisory services that will enable Fadama Users to adopt output enhancing technologies and more profitable marketing practices in their Fadama enterprises. The project finances (a) advisory services that are required for new investment activities in Fadama area on request by the User groups (b) advisory services that support ongoing activities by Fadama Users (NFDO, 2010).

#### **2.1.3.3.5.5 Project management, monitoring and evaluation**

This lends support to new or existing entities and mechanisms at the state and local government levels of government for overall project coordination and supervision and

would help to strengthen the effectiveness and quality of project operations. The monitoring and evaluation sub - component will measure performance at various project milestones and has two components: Management Information Systems (MIS) and Impact Evaluations and Beneficiary Assessment. The project will finance consultant services to develop and implement studies to evaluate the impact of the sub- projects and provide feedback to improve project implementation performance including an impact assessment at the mid- term and end of the project (Imo SFCO, 2010).

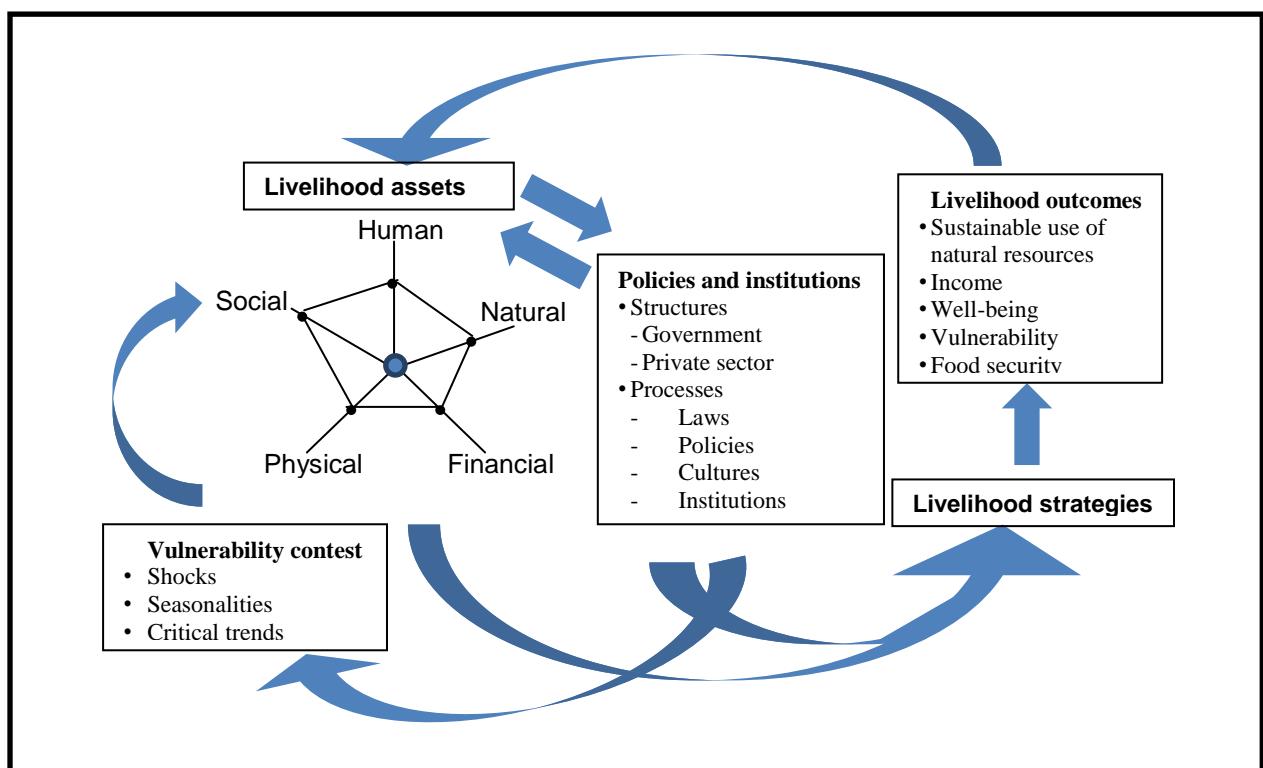
## **2.2 Theoretical Literature**

Over the years, various theoretical frameworks have been used in analysing household livelihoods. Most of these frameworks were microeconomic models not adequate to cover factors shaping household livelihoods. However this study was guided by The Sustainable Livelihood Framework (SLF) as formulated by the Department for International Development (DFID) (2000).

### **2.2.1 The Sustainable Livelihoods Framework**

The framework argues that people have objectives (livelihood outcomes) that they desire to achieve in their lives. In striving to achieve them, they undertake certain activities (livelihood strategies) using certain resources (livelihood assets) that they can access. However, this endeavour is mediated by structures and processes, which determine access, terms of exchange and returns. The interplay of these processes takes place in a wider external environment of vulnerability, (Saranta 2013).

The concept of Sustainable Livelihood is an attempt to go beyond the narrow conventional approaches which have focused only on certain aspects of poverty, such as low income excluding other aspects such as vulnerability and social exclusion.



**Figure 2. 1. The Sustainable Livelihood Framework. Source: DFID 2000**

The framework pays more attention to the various factors and processes which either constrain or enhance poor people's ability to make a living in an economically, ecologically, and socially sustainable manner (Krantz, 2001). It takes into consideration the context in which households and individuals operate (i.e. macroeconomic, social, political, environmental, demographic, historical factors), livelihood resources available to households (i.e. economic, natural, physical, human, social and

political capital); institutional processes and structures that operate within the communities; livelihood strategies that are pursued by households and the livelihood outcomes derived from these strategies (i.e. conditions of well-being, access to food, health, education, safety) are also depicted in the framework. See Table 2.1 below.

Table 2.2: Sustainable Livelihood Framework Table.

<b>Assets</b>	<b>Modified by</b>	<b>Context</b>	<b>Results/effect</b>	<b>Characteristics</b>	<b>Impact</b>
Natural Capital Physical Capital Human Capital Social Capital Financial Capital	Social Relations Gender Class Age	Trends Demographic Migration Technological change Macro policy Relative prices National and global economic trends	Various Livelihood strategies	Natural Resource/Farm based strategies Cultivation of food Cultivation of cash crops (non-food) Livestock production	Livelihood security Increased Income levels Income stability Degrees of risk Seasonality
	Institutions, Social rules, Land tenure, Market systems.	Shocks drought Pest Disease outbreaks Floods		Non-Natural Resources/off farm strategies Rural trade Rural manufacturing Remittances Other transfers Migration	Environmental suitability Bio diversity Soil and land quality Water Forests Flora and fauna
	Organizations NGOs Community based organizations/associations, Local Government				

Source: Department for International Development (DFID) 2000

### **2.2.2 Components of the Livelihood System**

According to the Sustainable Livelihood Framework, a livelihood system comprises of five components linked, related and influencing each other in a myriad of ways (fig2.1). They include livelihood assets; transforming structures and processes; livelihood strategies, vulnerability context and livelihood outcomes. Each of the components is made up of sub - elements that influence each other internally.

### **2.2.3 Livelihood resources**

Livelihood resources available to the household can be referred to as different forms of capital, from which productive streams can be derived to construct a livelihood. These include natural capital (the natural resource stock e.g. soil, water), economic and financial capital (such as cash, credit, savings and economic assets), human capital (skill and knowledge) and social capital (such as networks, social relations or associations) Michel (2011).

The concept of livelihood resources has been given differently by different authors. Chambers and Conway (1992) define it as assets of types, viz., tangible (resources and stores), and intangible (claims and access). On the other hand, Scoones (1998) identified four different types of livelihood resources as natural capital (natural resource stocks), economic/financial capital (saving, credit, remittance, pensions), human capital (skill, knowledge, ability to labour, good health), and social capital (networks, memberships). In addition to

Scoones (1998), Carney (1998) identified one more capital assets, i.e. physical capital (infrastructure, production equipments).

Livelihoods are often shaped by the access to and control over these resources and at the same time are affected by political, economic, and socio-cultural circumstances (termed ‘structures and processes’ by Carney (1998) and ‘institutional processes and organizational structures’ by Scoones (1998), Besides, in the due course of making a livelihood, people have to cope with stresses and shocks; and at the same time create and embrace new opportunities (termed ‘vulnerability context’ by Carney (1998) and context, conditions, and trends’ by Scoones (1998). These vulnerabilities, together with opportunities influence on the management and utilization of resources, and on the choices made. These ideas are very well explained in the sustainable rural livelihoods framework given by Department for International Development (DFID) (Carney, 1998; DFID, 1999) and Institute of Development Studies IDS) (Scoones, 1998). The frameworks have been used as conceptual frameworks in some of the livelihood studies done in rural Africa and Asia (Thennakoon, 2004; shah et al., 2005; Babulo *et al.*, 2008).

The five (common) capitals can be summarised as follows (Messer & Townsley, 2003; De Haan, 2006):

- (a) Natural capital consists of natural resources like land, water, forests, livestock and minerals. As the poor can lack ownership of these assets

they are often reliant on common pool resources like rivers or community forests.

- (b) Physical capital consists of manufactured assets like buildings, infrastructure, tools and market facilities.
- (c) Human capital comprises people's skills, knowledge, experience, and labour productivity.
- (d) Social capital is the "quality of relations between people" (De Haan, 2006) which can comprise family relations or cohesion in the community. It is argued that social capital is the most important asset for rural people because it allows them to gain easier "access to resources" (Bebbington, 1999). In other words, social capital can be a catalyst to increase access to the other four kinds of capitals.
- (e) Finally, financial capital includes all the financial means of the household like cash, savings, or credit.

#### **2.2.4 Access**

Access is a central component of the livelihood framework. While all livelihood researchers agree that access is important, access is not easy to define and it cannot be easily measured or counted like assets. Looking at the different ways that access has been defined by prominent organizations and researchers some consistent themes emerge. The definitions of access all focus on either institutions or social rules and norms (Davies 1997; DFID 2009; Ellis 2001; Scoones 1998). Institutions are a manifestation of social rules and norms,

and can be described as ‘regularized patterns of behavior structured by rules that have widespread use in society’ (Carswell 1997). In his dissertation on institutions and livelihoods in Mali, Charles Benjamin (2004) defines institutions as ‘reoccurring social situations shaped by shared formal and informal rules, norms and strategies’. Institutions determine how: community resources are governed, land tenure arrangements are conducted, community decisions are made, conflicts are resolved, household resources are distributed, natural resources are managed and social services are accessed. Institutions are the ‘gateways through which people pass on the route to positive or negative livelihood adaptation’ (Davies 1997). Ian Scoones (1998) defines access by ‘the rules and social norms that determine the differential ability of people in rural areas to own, control, otherwise claim or make use of resources such as land and common property. Not everyone has equal access. An individual’s access is determined by their assets and their social relations, or their social positioning within households, communities and society, which comprises such factors as gender, social standing, income, caste, class, age, ethnicity and religion (Ellis 2000). In developing countries the social rules and norms that shape gender and class distinctions are important factors in determining livelihood opportunities (Rakodi 2002; Brujin 1995).

### **2.2.5 Livelihood activities**

Activities are a convenient intermediate measure to link assets and outcomes.

They are the most visible sign of an individual’s or household’s success.

Livelihood activity options are dependent on an individual's assets and their ability to convert assets to activities (Ellis 2000; Rakodi 2002). There are distinct patterns in the types of activities pursued by different social groups, patterns that are structured by similar assets and abilities to access different activities (Ellis 2000; Gladwin 2001, Jiggins 1989; Rakodi 2002). The most desirable high return activities generally also have high entry barriers and individuals without the necessary financial capital, education, or social attributes are excluded from participating.

### **2.2.6        Household Vulnerability**

People's lives are dynamic and from time to time move in and out of poverty due to changes and influences from the environment they live in (Elasha, Elhassan, Ahmed, Zakielldin, 2005). This environment is referred to as the vulnerability context which forms the external environment in which people exist and gain importance through direct impacts upon people's asset status (Devereux, 2001). It comprises trends (i.e. demographic trends; resource trends; trends in governance), shocks (i.e. human, livestock or crop health shocks; natural hazards, like floods or earthquakes; economic shocks; conflicts in form of national or international wars) and seasonality (i.e. seasonality of prices, products or employment opportunities) (Allison & Ellis 2001; Ellis, 2000). People's livelihoods and assets are affected by trends, shocks and seasonality over which they have limited or no control (DFID, 1999). Vulnerability depends upon the assets that a household has and the extent to

which the asset holders can adapt (Carney, 1998). Therefore, vulnerability is characterised as insecurity in the well-being of individuals, households, and communities in the face of changes in their external environment (Devereux, 2001).

However, it is important to point out that the same framework falls short of addressing the positive side of the trends that exist. Not all trends and seasonality must be considered as negative; they can move in favourable directions, too. Trends in new technologies or seasonality of prices could be used as opportunities to secure livelihoods (Carney, 2002). In other words, the term ‘vulnerability context’ suggests that these trends are directly or indirectly responsible for hardships faced by people, but it is not always the case.

### **2.2.7 Livelihood asset**

Assets form the foundation of the livelihood framework. They are the tangible (i.e. farming equipment or livestock), or intangible (i.e. social networks or political influence) means that enable participation in certain livelihood activities. Everything from education and job networks to livelihood tools and fruit trees can be considered assets. “Assets are not simply resources that people use in building livelihoods: they are assets that give them the capability to be and to act. Assets should not be understood only as things that allow survival, adaptation and poverty eradication: they are also the basis of agents' power to act and to reproduce, challenge or change the rules that govern the control, use and transformation of resources” (Bebbington, 1999). Assets are

constantly changing due to different incentives, external shocks and internal demographic factors. Assets can be stored, accumulated, exchanged, or depleted and put to work to generate a flow of income or other benefits (Rakodi 2002). Because assets can be privately held by individuals, collectively held by a restricted group, or collectively held without access restrictions, it is important to look at access rights and how access affects returns and the distribution of returns. Some assets, such as financial capital, can be applied to many activities, but others, like blacksmith tools are only useful for particular activities. Asset flexibility and substitutability are critical for livelihood security (Barrett and Reardon 2000). Asset fixity, which refers to less fungible assets, makes livelihoods more vulnerable. Livestock, for example, are quite fungible assets: they can be used for reproduction, or provide manure (for fertilizer), animal traction (for plowing), transportation, and milk. Asset flexibility can also refer to the ability to trade-off between capitals, i.e. if a poor woman lacks land, she will try to acquire a plot through her network of social relations (De Haan 2005). There are many different types of assets and researchers have categorized them in many ways to serve their particular objectives. For example, Reardon and Vosti (1995) divide assets between natural resources, human resources, on farm physical and financial assets and off farm physical and financial resources to draw distinction between farm and nonfarm activities (Ellis 2000). Swift (1989) uses three broad categories to describe assets: investments, stores, and claims (Ellis 2000). Generally though,

livelihood researchers group assets under five categories: social/political, financial, physical, natural, and human (Bebbington 1999; Conway 1998; De Haan 2001; Ellis 1999, 2000; Scoones 1998). These five types of assets are described in more detail below.

#### **2.2.7.1 Human assets:**

Human assets capture the labor resources available to the households and individuals, in both their qualitative and quantitative dimensions. Household size, health, education and skills are all considered to be aspects of human capital. Individual human assets have prescribed traits like gender, age, and ethnic group, as well as acquired capital like education, skills and experience. Household capital is in constant flux due to internal demographic reasons (births, deaths, marriage, migration, children growing older), and to deliberate restructuring to meet unexpected events or external pressures (Moser 1998). For example, a drought in the rural areas might motivate urban migration and greater access to urban job markets might encourage a higher investment in education. Human capital can be enhanced through education and skill training and improved health care services.

#### **2.2.7.2 Social assets:**

Social capital can be seen as enhancing the capacity of individuals, households, small groups, or whole societies. At a community level the concept is useful for describing the qualities of a community that make collective action and civil society possible. Organizations and networks give individuals access to

livelihood activities and opportunities that they would not be able to access on their own. The key point is that social capital has value just like a plow (physical capital) or a high school diploma (human capital). There are a wide variety of definitions of social capital, but most have the following components in common: social networks, relationships of trust and reciprocity, and organizational membership. Networks are a set of relations or ties between individuals, households, social groups or communities. The ties may be based on kinship, ethnicity, friendship, village memberships, patron-client relationships, or political party. In rural communities organizations and associations are integral to the social and economic fabric of the community. Organizations can play an important role in facilitating livelihood activities. They might provide money, income generating activities, advice, food, or even business opportunities to their members. An organization in this thesis will be simply defined as a coordinated group of individuals bound together by a common objective. Rural communities are often sites of dense social networks, strongly held norms of generalized reciprocity and social trust, and multiple associations and organizations that are critical for collective action and individual survival. Social and political capital can be difficult to separate and are often considered synonymous in rural areas. Political capital depends on social capital, and the two forms of capital positively reinforce each other. For example, the chief of a village generally has a high degree of both social and

political capital and his authority is based in the shared values, norms and cultural identity of the community.

#### **2.2.7.3 Natural assets**

Natural assets are the resources found in the land, water and other natural landscapes that are useful for livelihood survival or enhancement. Rural populations are especially dependent on natural assets for their livelihood activities (Benjamin 2004). Natural assets are often held as common pool resources, accessible to all of the population. Land is generally considered the key asset for rural peasants (Cornia 1994). Land tenure must be considered in relationship to natural assets, because a complicated set of access rules and rights often dictate land ownership and usage (Crowley 1991). Livelihood activities that utilize natural assets include farming, fishing, hunting, mineral extraction, and collecting fruits, plants and firewood. Most of the natural assets relied on by rural populations are renewable resources, but in some areas nonrenewable resources, like gold or oil, are critical for livelihoods. Natural assets are not static and can be degraded or enhanced over time, depending on how they are managed.

#### **2.2.7.4 Physical assets:**

Physical assets are generated by production processes to provide the means which enable people to pursue their livelihood activities. For example: tools, machines, roads, communication systems, and land improvements like terraces or irrigation, canals are all considered physical assets (Rakodi 2002). Physical

assets are investments in a future flow of returns, as opposed to a consumer goods purchased for its direct effect on material standards of living. Consumer goods, such as a solar panel, can become a physical asset when it is put to a productive use, like recharging car batteries for small fees. Physical assets may be individually or collectively held. Blacksmithing tools are privately held and critical to the livelihood of a blacksmith, whereas roads, power lines and other infrastructure are community assets that everyone can draw benefits from. Infrastructure is especially important for facilitating livelihood diversification. Roads, for example, have multiple effects: they reduce the spatial cost of transactions in resources and outputs; facilitate the movement of people between places offering different income earning opportunities; create markets; and play an important role in transfer of information (Rakodi 2002).

#### **2.2.7.5 Financial assets:**

Financial assets are savings, income and any other assets that are held as wealth or can easily be converted to cash. Stocks of money are often held in unusual and unpredictable ways, in rural areas where banks are not available. Financial capital could consist of loans, gold, livestock, remittances, or informal credit associations.

#### **2.2.8 The Role of Capital Assets in Livelihood Choices**

The livelihoods framework is founded on a belief that people require a range of assets to achieve positive livelihood outcomes. The word “capital” has been used widely in literature for these assets, but not strictly in the economic sense,

rather, the assets are best thought as livelihood building blocks (DFID, 1999).

A central notion is that different households have different access livelihood assets, which the sustainable livelihood approach aims to expand. These assets include human, financial, physical, social and natural assets.

The aim of the livelihoods approach is to identify the strengths in the livelihoods of the most vulnerable groups in society that can be built upon according to their available assets in order to reduce poverty, rather than focusing on vulnerabilities (Ellis & Freeman, 2005). A range of assets is needed to yield the entire livelihood outcomes that people require. The livelihood assets, which the poor must often make trade-offs and choices about, comprise:

- Natural capital refers to the natural resource base (land and produce, water and aquatic resources, trees and forest products, wildlife, wild foods and fibres, biodiversity, environmental services). There is a close relationship between natural capital and the vulnerability context because most of the livelihoods shocks for instance are a result of natural processes that destroy natural capital. Understanding the available natural resources and preserving them for current and future use is important in achieving sustainable livelihood outcomes.
- Physical capital refers to assets brought into existence by economic production processes such as infrastructure (transport, roads, vehicles, secure shelter and buildings, water supply and sanitation, energy,

communications), tools and technology (tools and equipment for production, seed, fertilizer, pesticides, traditional technology).

- Human capital refers to the educational level and health status of individuals and populations. (i.e. health, nutrition, education, knowledge and skills, capacity to work, capacity to adapt).
- Financial capital refers to stock of cash that can be accessed to purchase either production or consumption goods. Two main sources of financial capital are available stock in the form of cash, savings, credit or debt, and regular inflows of money such as labour income, remittances or pensions. Financial capital can be converted into other types of capital that provide people with livelihood options and enable them to adopt different livelihood strategies and achieve livelihood strategies such as purchasing food or acquiring means of production (Cattermoult *et al.*, 2008).
- Social capital refers to the social networks in which people participate and from which they can derive support that contributes to their livelihoods. It places emphasis on people and the way they interact with one another and with systems within their communities. It represents the social resources upon which people draw on to achieve their livelihood outcomes (Ashley, 2000). Examples include networks and connections (patronage, neighbourhoods, and kinship), relations of trust and mutual understanding and support, formal and informal groups, shared values

and behaviours, common rules and sanctions, collective representation, mechanisms for participation in decision-making and leadership. (Scoones 1995, Chambers and Conway 1992).

It is important to understand the dynamic nature of the five capital assets in sustaining people. For instance, while livestock is considered to be physical capital in providing animal traction, it can also generate social capital by providing prestige and connections in the community and still be a form of natural capital.

### **2.2.9            The Role of Structures and Processes in Shaping Livelihoods**

Transforming structures and processes are institutions, organisations, policies and legislation that shape livelihoods, determine access to various types of capital (DFID, 1999) and also determine how assets may be utilised.

Institutional and policy processes operate within specific contexts such as the people's history, climate change and other trends and shocks. Transforming structures and processes are of central importance as they operate at all levels and effectively determine access, terms of exchange between different types of capital, and returns to any given livelihood strategy (Shankland, 2000; Keeley, 2001). Kollmar and Gamper (2002:) describe structures as the hardware (private and public organisations) "that set and implement policy and legislation, deliver services, purchase, trade and perform all manner of other functions that affect livelihoods" (DFID, 2000). Structures are the public and private sector organisations that set and implement policy and legislation;

deliver services; and purchase, trade, and perform all manner of other functions that affect livelihoods (Serrat, 2008). Complementary to structures, processes constitute the “software” determining the way in which structures and individuals operate and interact. Processes embrace the laws, regulations, policies, operational arrangements, agreements, societal norms and practices that in turn determine the way in which structures operate (Shankland, 2000). Important processes for livelihoods include policies, legislation and institutions and also culture and power relations. These may serve as incentives for people to make choices, they may be responsible for access to assets or they may enable stakeholders to transform and substitute one type of asset through another (Kollmar and Juli, 2002).

Both structures and processes do influence people to make livelihood choices. It is important to recognise that while structures and processes are vital in transforming assets and enhancing livelihoods, they can be restrictive if they are not representative and pro-poor (Ellis, 2000). Transforming structures and processes occupy a central position in the framework and directly feedback to the vulnerability context.

### **2.2.10 Livelihood Outcomes**

Livelihood outcomes are the achievements of livelihood strategies, such as more income, increased well-being, reduced vulnerability, improved food security and a more sustainable use of natural resources (DFID, 1999; Carney, 2002). These outcomes are usually a result of a combination of strategies

people adopt at individual and community level and can show how people reacted to their context and utilised the various resources at their disposal. Reducing the vulnerability of rural households and increasing the overall security of livelihoods, however, is generally the priority of livelihood interventions (Barrett and Reardon 2000; Haggblade *et al*, 2007). It is important to note that due to the influence of structures and processes, different people and communities will combine resources differently to arrive at their desired livelihood outcomes. This thesis will focus on the outcomes of asset enhancement and activity diversification as the primary indicators of livelihood success. An individual or household that is able to enhance their assets (e.g. build a more secure house, increase livestock herds, or improve their social networks) and diversify their income portfolios will be more secure and less at risk for livelihood failure than those with weak assets and single income sources.

### **2.2.11 Livelihood strategies**

According to DFID's sustainable livelihoods glossary the term *livelihood strategies* denotes: “the range and combination of activities and choices that people make in order to achieve their livelihood goals. Livelihood strategies include: how people combine their income generating activities; the way in which they use their assets; which assets they chose to invest in; and how they manage to preserve existing assets and income. Put differently, they refer to coping and adaptive strategies that are employed by farmers. Decisions on

livelihood strategies may invoke natural- resource based activities, non-natural resource based and off-farm activities, migration and remittances, pensions and grants, intensification versus diversification, and short-term versus long-term outcomes, some of which may compete. This means they have to be understood as a dynamic process in which people combine activities to meet their various needs at different times and on different geographical or economical levels, whereas they may even differ within a household.

Studies have drawn attention to the enormous diversity of livelihood strategies at every level-within geographic areas, across households and over time (DFID, 1999; Scoones *et al.*, 1998). A common manifestation of this is at the household level where a member of the household lives in different places, temporarily or permanently through migration. At the same time, this member engages in gardening and off farm work when they are in the household. Essentially, it is important to analyse households' and communities' strategies within their wider context (Scoones, 1998). Livelihoods are diverse at every level, for example, members of a household may live and work in different places engaging in various activities, either temporarily or permanently. Individuals themselves may rely on a range of different income-generating activities at the same time" (DFID, 2001).

Livelihood strategies are defined by the way a household or an individual puts together their activity portfolio. Livelihood strategies may include: agriculture intensification, migration, nonfarm activities, and farm diversification. While a

household's activities can be described by one of these strategies, more commonly the diversity of activities a household is involved in does not fall neatly into a single category. One way of distinguishing the different activity strategies is whether they are pursued as part of a coping or an accumulation strategy. For some, diversification is pursued as a survival mechanism, but for others it is a strategy for income and asset accumulation. Livelihood strategies are basically the activities and methods people employ to (maintain or) improve their livelihood assets and to reduce their vulnerability (De Haan, 2006). These strategies "depend on how they can combine their livelihood assets, take into account the vulnerability context in which they live, and the policies, institutions and processes that affect them. The livelihood outcomes that households achieve with their strategies can depend on any or all of these elements" (Messer & Townsley, 2003). Clearly, the term livelihood strategies emphasises the agency of the poor households. However, it is now understood that (even risk managing- or crisis averting-) "behaviour is not always intentional and conscious" (De Haan, 2006).

Ultimately, livelihood outcomes are determined by the livelihood strategies adopted by a household or an individual. Livelihood strategies are the diverse actions oriented towards meeting desirable needs, involving manipulations of livelihood resources and constructing regulatory mechanisms at different levels of society (Dharmawan and Manig, 2000). As stated before, people use livelihood strategies to obtain and maintain an adequate livelihood. In

livelihood strategies, a distinction can be made between ‘proactive’ and ‘reactive’ strategies. The proactive component is the way households are “enhancing and exercising capabilities in adapting to, exploiting and creating change and in assuring continuity” (Chambers & Conway, 1991). These are, in other words, the strategies employed in increasing the resilience of households to (future) external factors, and in increasing their standard of living. In contrast, the reactive component deals with coping with these external factors *ex post facto* and are aptly named coping strategies. These strategies could for example (if indeed in response to a shock or stress) include selling livestock for cash, having only one instead of two meals per day, or migrating from the affected area.

### **2.2.12 Classification of livelihood strategies**

Livelihood strategies maybe categorized into three broad groups according to Orr,(2001) and Scones, (1998): namely agricultural intensification/extensification, livelihood diversification, and migration. Under the first strategy, agricultural intensification/extensification, communities gain most of their livelihood from farming either through intensification (more output per unit area through capital investment or increase in labor inputs) or through extensification (bringing more area under cultivation).

Second livelihood strategy is livelihood diversification, which according to Ellis (1999), is defined as “the process by which households construct a diverse portfolio of activities and social support capabilities for survival and in order to

improve their standard of living". Studies reveal that in rural areas of low-income countries, farming alone is not sufficient to eke out a living Barret, Reardon, and Webb, 2001; Adu, 2007; Babulo *et al.*, 2008). As a result, most rural houses are found to depend on diverse income sources besides farming. It usually includes off-farm wage works, non-farm activities, non-farm self-employment, and remittance.

The third livelihood strategy is migration, which may be voluntary or involuntary. Furthermore, according to Ellis (1998), and (de Haan 1999), migration may be seasonal (according to agricultural season), circular (according to cyclical labor demands in non-farm labor markets), permanent (usually rural to urban), and international. Taylor and Wouterse, (2008) suggest that "household members who migrate can facilitate investments in new activities by providing liquidity, in the form of remittances, as well as income security, in the form of a promise to remit to the household in the event of an adverse income shock." This means migrant remittances can be useful in relieving rural credit constraints which may be viewed as a livelihood diversification strategy, as they are a source of income not related to household income from agriculture. Where formal insurance services and credit markets are not existent, migration can provide income that enable households cope with adverse income shocks as well as overcoming liquidity constraints. In a study on emigration to South Africa's mines by household members from Botswana, Lesotho, Malawi, Mozambique, Lucas (1987) noted that emigration

reduces crop production in the subsistence sector in the short run, but remittances enhance both crop productivity and cattle accumulation in the longer run.

Despite little consensus on the degree to which remittances is used for rural investment, it is widely agreed that migration forms a central part of rural people's risk mitigation strategies. Therefore, migration though often ignored and sometimes blocked by policy and institutions, is a very important factor of diverse rural livelihoods that can lead to improved rural livelihoods (de Haan, 1999).A household may pursue these three strategies singly or in combination together or in sequence. For the purpose of this study, emphasis will be laid on livelihood diversification strategy.

### **2.2.13      Livelihood Diversification**

Livelihood diversification is defined as the process by which rural families construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living (Ellis, 1997). Very few people collect all their income from any one source, hold all their wealth in the form of any single asset, or use their assets in just one activity which makes diversification the norm (Barrett *et al.*, 2001). Livelihood diversification can be seen as an attempt by individuals and households to find new ways to raise incomes and reduce environmental risk (Hussein and Nelson, 1998). Livelihood diversification would include both on- and off-farm activities undertaken to generate income additional to that from the main

household agricultural activities. Households may diversify through the production of other agricultural and non-agricultural goods and services, sale of waged labour, or self-employment in addition to other strategies undertaken to spread risk.

Income derived from farm livelihoods comprise both consumption-in-kind of own farm output and cash income from output sold. Off-farm income refers to wage or exchange labour on other farms-i.e. within agriculture. It also includes labour payments in kind, such as the harvest share systems and other non-wage labour. Non-farm income refers to non-agricultural income sources such as (i) non-farm rural wage employment, (ii) non-farm rural self-employment, (iii) property income (rents, etc.), (iv) urban-to-rural remittances arising from within national boundaries, and (v) international remittances arising from cross-border and overseas migration (Barrett *et al.*, 2001). From the definition by Ellis (1997) of rural livelihood diversification, it can be implied that prompted by survival or the need to improve their standard of living, households construct a diverse portfolio of activities and social support capabilities. They can combine a number of livelihood activities like agricultural crop production, livestock production, wage work, cottage industry etc. to provide or supplement income. The mix of activities will depend on a household's ability to access different livelihood opportunities (Ellis, 1997; Bryceson, 2002).

Barret, Reardon and Webb (2001) agree that few people obtain their living wages from just one source or use their goods or merchandise to just one activity. The authors classify these actions as primary and secondary. For them the primary actions can be also called *push factors* the ones that would be related to risk reduction (as land becomes restrict by population growing), reaction against crisis, business deal's high rates which sometimes drive rural families to auto-sufficiency in several services and goods; the secondary actions called *pull factors*, would be connected to complementary strategies implementation into activities such as cultural integration with animals from the environment and industrial products. Diversification of rural properties, according to Ellis (2000), is strongly related to the creation of diversity as a social and economical process usually existent into a family unit. This process shows the pressure factors that come from family environment as well as the opportunities that make the families adopt complexes and different ways of earn living. An essential characteristic of rural families in developing countries is their adaptation ability when it concerns survival, it means they are able to change their way of living due to the changes on the circumstances that they will face, especially strategic changes in their living and its features as well as their activities' impact on the environment (Ellis, 2000).

The literature on livelihood diversification, which crosses several related fields and disciplinary approaches, is characterized by many terms and definitions. For the purpose of this study, a modified version of Ellis' (2000) definition of

livelihood diversification would be used; Frank Ellis (2000) defines rural livelihood diversification “as the process by which rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living”. The need emerges generally either out of necessity (Stark 1991), which relates to involuntarily driving forces, or out of choice (Stark 1991), which points to the voluntarily and proactive role of households. The avoidance of ‘risk’ is both the main stimulant for livelihood diversification, and the dividing line between necessity and choice. According to sustainable livelihoods research, diversity (i.e. the exploitation of multiple assets and sources of revenue) is an intrinsic attribute of many rural livelihood strategies (Ellis 2000). Rural livelihoods diversification has generally occurred as a result of an increased importance of off-farm wage labor in household livelihood portfolio or through the development of new forms of on-farm/on-site production of non-conventional marketable commodities. In both cases, diversification ranges from a temporary change of household livelihood portfolio (*occasional diversification*) to a deliberate attempt to optimize household capacity to take advantage of ever-changing opportunities and cope with unexpected constraints (*strategic diversification*).

View of Livelihood diversification is supported by a considerable literature and much empirical evidence, that livelihood diversification is generally a good thing for rural poverty reduction. It helps to lessen the vulnerability of the poor to food insecurity and livelihood collapse; it can provide the basis for building

assets that permit individuals and households to construct their own exit routes out of poverty; and it can improve the quality and sustainability of natural resources that constitute key assets in rural livelihoods. These effects occur because diversification widens people's options, encourages spatially diverse transactions, increases cash in circulation in rural areas, and enhances human capital by providing those who diversify with new skills and experiences. This literature can be verified by lots of studies (Turner, Hyden and Kates, 1993; Ashley, 2000; Center for Economic and Social Studies, 2003; D'Silva, Wani, and Naganath, 2004; Sreedevi, Shiferaw and Wani, 2004; Reddy and John, 2001; Wani, Pathak, Tam, Ramakrishna, Singh, and Sreedevi, 2002; Sudan 2007; Herani, 2002; Herani, Rajar, Khaskheli, 2007; Rajar, Herani and Dhakan, 2007; Herani, 2007, Herani, Rajar and Dhakan, 2007).

It is also worth mentioning that by livelihood diversification people become able to produce more production because they become able to use more inputs for the lands. It is also found that richer get more benefits than poor. It can be verified from couple of studies from Asia, Africa, Ghana and some other countries (Sudan, 2007; Herani, 2002; Herani, Rajar, Khaskheli, 2007; Rajar, *et al.* 2007; Herani 2007, Herani, *et al.*, 2007); Whitehead, 2002; Slater, 2002; Oberhauser & Pratt, 2004; Oberhauser, *et al.* 2004; Mkandawire & Soludo, 2003; Mandel, 2006; Hanson, 2003; Grant & Nijman, 2004; Oberhauser & Hanson, 2007; Wong, 2006).

Numerous studies show that, while the prevalence of livelihood diversification is now well recognized (Reardon, et al., 1997; Ellis, 1998; 2000), there remains ample scope for differences in interpretation about what this signifies, especially for poverty reduction strategies and policies. Studies of rural portfolio generally converge on the once starting figure that, on average, roughly 50 percent of rural household incomes in low income countries are generated from engagement in non-farm activities and from urban areas or abroad (remittance and pension payments being the chief categories of such transfers). It is verified by recent studies in Africa (Bryceson and Jamal, 1997; Ellis and Freeman, 2004), as well as past evidence from Africa and Asia (Reardon, et al., 1997). In Latin America, average figure is significantly lower, at around 40 percent (Reardon et al., 2001).

Growing body of the literature argues, however, in a different way to the agriculture centered orthodoxy. In Sub-Saharan Africa, diversification can be represented as a failure of agriculture to produce a sufficient livelihood for a substantial proportion of rural dwellers (Bryceson and Bank, 2001; Bryceson, 2002). In Jammu and Kashmir diversification opportunities show that livelihood increase with the diversification (Sudan, 2007). In Nepal it is observed that people depending on farms, many of them lack chemical fertilizers to maintain it sustainable. Richer household may supplement farming with incomes from local business or employment (Garforth *et al.*, 1999; Floyd *et al.*, 2002; Springate-Bajinsky *et al.*). Yet Livelihood diversification may also

develop as coping response to the loss of capital assets needed for undertaking conventional on-farm production (Sudan, 2007). Some studies show livelihood security between diverse non-farm and farm components, in which the farm component become more productive and diminishes in importance within a diverse livelihood portfolio. Better off households diverse to livestock ownership, engagement in non-farm self employment, and diversity of on-farm and no-farm income sources (Ellis & Freedman, 2004). Numerous studies have observed that moving poverty is a cumulative process, often achieved in tiny increments. Assets are traded up in sequence, for example, chicken to goats, to land; or cash from non-farm incomes to farm inputs to higher farm incomes to land or livestock (Ellis & Mdoe, 2003). Fundamental role played by diversification is reduction in poverty and help to overcome that constraint. As Rakodi (2002.) state, it is important to keep “people and household in which they live at the centre of the development process, starting with their capabilities and assets, rather than with their problems.” Neo-liberal policies implemented in numerous developing countries across the globe are an outcome of the increasing integration of economics operating on the basis of capitalist forces (Gwynne *et al.*, 2003).

Numerous studies from Ghana examine the link between livelihood strategies and gender relation, especially at the household level (Francis, 2000; Mandel, 2006; Oberhauser & Pratt, 2004). In a study of trade activities among women in Porto Novo, Benin, (Mandel, 2006) concludes that spatial mobility is a

critical aspect of access to supplies and markets for goods by women in their urban livelihoods. Some others latest studies are also available for the further going in details to related literature with helps in finding out the livelihood (Rena, 2007; Pollin, Epstein & Ndikumana, 2006; United Nations, 2007). Literature from developed to developing countries reveals that livelihood diversification is significant in the growth and development. Asian studies reveal that livelihood diversification is necessary for the developing countries to come out of poverty. Household and individuals can diversify livelihood portfolios in different ways. Several classifications of activities included in rural livelihood portfolios have been proposed (Hussein & Nelson 1999; Ellis 2000; Barrett, *et al.* 2001), focusing on different criteria (farm vs. non-farm; on-farm vs. off-farm activities; local vs. migratory; self-employment vs. wage labor). All these classifications are useful to make sense of the nature of the choices entailed by livelihoods diversification processes (De Janvry, 1991). Overall, enterprise-based diversification looks attractive because of its alleged capacity to promote more sustainable rural livelihoods. Dixon, Gulliver and Gibbon (2001) have identified the development of small-scale, labor-intensive household enterprises as the most promising rural poverty reduction strategy. Moreover, several studies (Barrett, *et al.* 2001; Ellis & Bahiigwa, 2001; Ferreira & Lanjouw, 2001; Escobal, 2001) indicate that in a variety of regional and local settings farmers capable of combining conventional farming activities with innovative rural enterprises enjoy higher income and safer livelihoods

than farmers deriving their income from conventional farming alone or from a combination of conventional farming and wage labor.

Households and individuals can diversify livelihoods portfolios in different ways. Hussein & Nelson (1999) and Ellis (2000) propose the classifications of activities included in rural livelihood portfolios focusing on different criteria that include for example (i) farm versus non-farm;(ii) on-farm versus off-farm activities; (iii) local versus migratory and (iv) self employment versus wage labor. In Sub-Saharan Africa, livelihood diversification has come to symbolise a state of affairs which is quite distinct from the minor adjustments at the margin implied by the classic reasons for doing so, (Ellis,2000).The overall flavour of evolving rural circumstances in the 1990s was captured in rather eclectic fashion by the Deagrarianization and Rural Employment (DARE) project conducted by the African Studies Centre at Leiden University (Bryceson, 1996; 1999; 2002; Bryceson & Jamal, 1997). This multi-country project utilised a mixture of qualitative and quantitative methods to derive a composite picture of the relative collapse of agriculture as the primary source of rural livelihoods in Sub Saharan Africa, and the associated broadening pursuit of non-farm options across the continent. Various empirical studies show that different livelihood diversification strategies exist in the sub-Saharan countries even though the forms and people's participation level may vary. According to Scoones (1998), the combination of livelihood resources (different livelihood asset) are resulting in the ability of people to follow the

combination of livelihood strategies. Consistent with the earlier statement, in many rural parts of the country, the recurrent drought along with the environmental degradation is becoming a serious threat to the livelihood of the poor. However, some households successfully respond to these events, and exhibit livelihood systems that are able to resilient (Validivia *et al.*, 2005) while others do not. Furthermore, the productive agrarian capital which is basically land is becoming scarce mainly due to the high population pressure. Due to the insufficient land resource to absorb the household's full labor force endowment and the rain fall pattern variability in the area, the agricultural sector is becoming a risky economic activity which has low return in income. Thus, the farming people in the area are compelled to seek out off-farm or non-farm income source. In spite of this, as the household's access and returns to the different livelihood diversification strategies are affected by different internal and external factors, their participation is also varied. Similarly, different households adopt different strategies according to their particular asset and asset status (Ellis, 2000b). Thus, it needs location specific information to recommend for practicing sustainable livelihood diversification strategies within the farming community. Assets are the basic building blocks upon which households are able to undertake production, engage in labor markets and participate in reciprocal of exchanges with other households (Bezmere and Lerman, 2003; Brown *et al.*, 2006).

The livelihood assets available to the household represent the basic platform upon which the household livelihood may be built. In this definition, the conventional meaning of assets is expanded to include besides material and financial resources, also household members' skills and experience (human capital), their relations within wider communities (social capital) and their natural environment (natural capital). People draw on a set of capital assets as a basis for their livelihoods (Soussan *et al.*, 2000). However, - no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek (DFID, 1999). In conformity with this statement, Messer and Townsley (2003) suggested that members of a household should combine their capabilities, skills and knowledge with the different resources at their disposal to create activities that will enable them to achieve the best possible livelihood for themselves and the household as a whole. Hence, in order to create livelihoods, people must combine the assets that they have access to and control over (Chambers, 2003). Everything that goes towards creating that livelihood can be thought of as a livelihood asset. The diversity and amount of the different assets that households have at their disposal and the balance between them will affect what sort of livelihood they are able to create for themselves at any particular moment and the type of livelihood strategy to pursue.

Rural livelihood diversification in Sub Saharan Africa contains several paradoxes that are worth exploring for the light they shed on the actual and

potential role of agriculture in poverty reduction. It might be thought that diversification would be the last resort of those unable to gain a sufficient livelihood from their depleted farms, and there is some truth in this, but it is not the whole story. In the LADDER project, the positive correlation between per capita household incomes and share of income obtained from non-farm sources was strongly affirmed. Rural non-farm economy which comprises all non-agricultural activities that generate income to rural households can be classified on many dimensions such as: on-farm/off-farm, wage/self-employment, agriculturally related/otherwise (Davis, 2004; Davies, 2002). The ideal classification should capture activities closely linked to farming and the food chain, those producing goods and services for the local and distant market, and those producing for distant markets as well as those that are sufficiently large, productive and have capital to generate incomes above returns obtainable from farming.

From Figure 2.2, wage labour refers to the provision of work force to agricultural or non-agricultural enterprises owned by non-household employers. Though employment opportunities may be available locally (local wage labour) or in spatially distant areas from the places of residence which may entail seasonal or long-term migration (migratory wage labour), both types of wage labour are diversification strategy which complements on-farm production in meeting household consumption needs as well as re-capitalization of impoverished farms. Self-employment enterprises refer to

activities undertaken by mobilizing labour plus other household capital assets such as savings and land. These can be agricultural enterprises often based on innovative on-farm agricultural activities or non-agricultural enterprises focusing on activities such as processing of agricultural commodities, petty-trading, handicraft, cottage manufacturing.

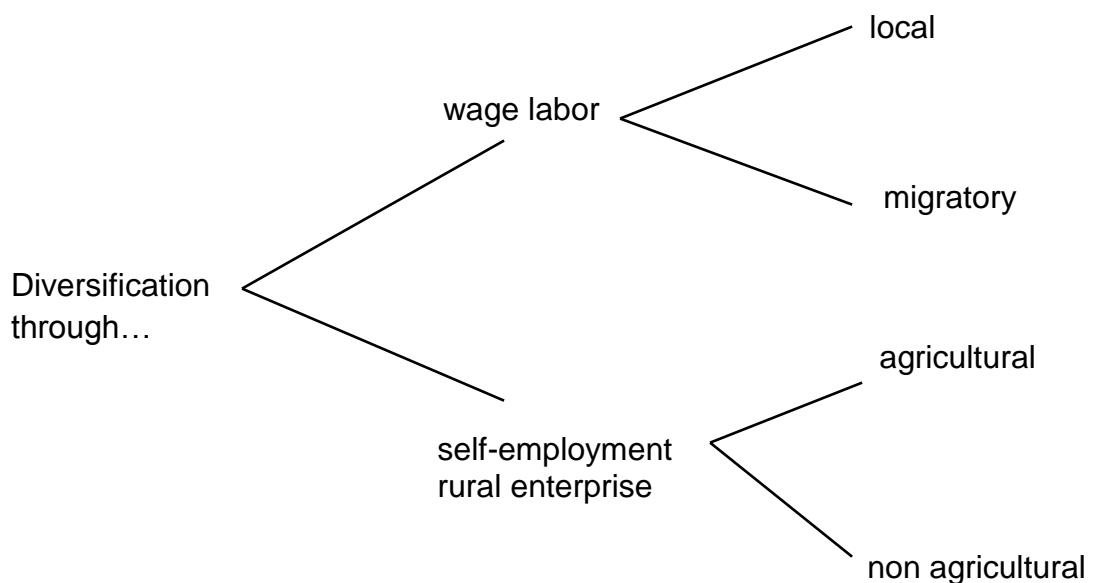


Figure 2.2: Diversification Paths

Source: Warren (2002)

However, there are differences in the way in which wage labour and self-employment impact rural livelihood strategies. Self-employment through rural enterprises is potentially more profitable than wage labour, although rural self-employment requires a higher capital risk (Woldehanna and Oskam 2001). In investigating rural livelihood strategies, it is important to note that as Carletto *et al.*, (2007) points out that:

“It would be misleading to see the growth in rural nonfarm activities in isolation from agriculture, as both form part of complex livelihood strategies adopted by rural households. High levels of income diversification are the norm among rural households. Rural nonfarm activities are often countercyclical with agriculture and, as such, may serve as a consumption smoothing or risk insurance mechanism, particularly when the returns to these activities are not highly-correlated with agricultural returns, and may also absorb excess labour during agricultural off-peak periods. Given the small-scale, informal and home based nature of some rural nonfarm self-employment activities, they are often heralded as a promising strategic complement to agriculture for rural poverty alleviation.” Because poverty in Africa is prevalent in rural areas, efforts towards increasing rural employment and income is crucial to fight the surge of poverty. Rural employment refers to activities that go beyond agricultural production on the farm to diverse livelihood strategies. An increase in rural incomes will likely improve the living standards of the rural poor, but also drive a structural transformation of the whole economy (Nkurunziza, 2006). The fact that agriculture is the main source of livelihood for the majority of Africans, Africa will need to develop its agriculture in order to feed its population but more importantly develop linkages with other sectors of the economy.

## **2.2.14 Determinants of Livelihood Diversification**

Diversification among rural households is mainly influenced by differences in resource endowments such as land, labour, capital including access to markets and institutions (Barrett *et al.*, 2001). Opportunities to diversity vary among households with asset portfolios determining whether the effects of diversification are positive or negative. Households may have similar endowments and opportunities but do not always select the same portfolio of activities. Differences occur in preferences for income, consumption, wealth and status and risk in addition to subjective elements such as enterprise styles. However, a household's ability to adopt more profitable diversification strategies is also determined by it having the skills, location, capital and social connections to pursue other activities (Hussein and Nelson, 1998). Improving household food security and incomes may motivate a household to diversify, but the selection of actual strategies by a household is determined by some of the factors explained below.

### **2.2.14.1 Access to Markets**

Diversification may be used as a risk management and survival strategy in instances where the absence of markets compels self-provision of some goods and services by households through diversification. To further explain this, Barrett *et al.*, (2001) provides a hypothetical example on why a skilled blacksmith spends his scarce time farming even though his comparative advantage lies in smith work. Missing land markets are used to explain his

behaviour given that if land markets are operational, he might rent out or sell his land and devote all his time to blacksmithing. But in the absence of land markets, and in the presence of labour market imperfections that preclude his simply hiring others to work his land for him, his optimal use of labour time may well include time spent on relatively less productive farming, else his land asset returns nothing to him Barrett et al., (2001). Therefore, diversification of labour activities and income in this instance would be driven by the absence of markets.

Several studies have also noted that where physical access to markets is costly and causes product markets failures, households diversify production patterns partly to satisfy own demand for diversity in consumption. In addition earnings from diversification where access to credit is non-existent can enable overcoming working of capital constraints, purchasing necessary inputs, equipment or capital improvements on one's farm (Barrett, 2001; Omamo, 1998).

Closeness to urban markets may create opportunities for diversification into rural non-farm activities such as peri-urban areas where possibilities exist for earnings from commuting (Davis, 2004). However, it should not be overlooked that in some cases, closeness to urban areas exposes rural non-farm manufacturers to high competition from factory-made substitutes sold in rural market centers. This may lessen the extent to which rural households can diversify.

## **2.2.14.2 Climate Variability**

Climate variability affects farm production especially for smallholder farmers. Persistent diminishing returns from agriculture which threaten food security may prompt household to diversify. This implies that a key motivation for diversification is environmental uncertainty related to unreliable rainfall or drought which makes diversification “a form of self-insurance” Barrett et al., (2001). In their study of livelihoods in India and Tanzania, Jodha and Mascarenhas (1983) refer to "household risk strategies" rather than livelihood diversification or livelihood strategies. Berry 1980 expands on this notion of risk ( Bernstein et al., 1992) that “...diversification of income-earning activities is a key factor because farming in Africa is usually so risky: crop yields are subject to the uncertainties of rainfall and input supply, and farming incomes are subject to the uncertainties of both yields and prices.” This means the decision to diversify may also be driven by the need to cope with climatic variability or extreme weather patterns such as drought. Diversification is then seen as a natural response to climatic risk and transactions costs in lower potential agricultural areas (Haggblade, Hazell, Brown, 1989). When crops fail or livestock die, households respond by reallocating labour to other pursuits such as formal employment off-farm, informal employment off-farm (e.g. hunting), or non-agricultural activities on-farm (e.g. weaving, brewing). This is confirmed by Reardon (1992) findings from Burkina Faso, revealed that off-farm employment provided cash income in labour earnings to weather the

effects of drought, thereby giving those with rural nonfarm incomes superior coping capacity.

Notwithstanding the aforementioned, whilst diversification is a natural response to climatic risk evidence, from Africa reveals that non-farm activity highest in areas of better-than-average agricultural productivity, which underscores the importance of taking into consideration inter-sectoral linkages (Haggblade *et al.*, 1989; Reardon, 1997). Depending on the context, this may mean nonfarm livelihood diversification maybe undertaken to complement farming activities rather than a substitute them. Climate variability may drive households towards diversification or hinder it.

#### **2.2.14.3 Available Asset Portfolios**

The availability of assets such as savings, land, labour, education, access to market or employment opportunities and other public goods is a primary factor in determining a household's capability to diversify Warren (2002). Opportunities to diversity vary among households (Mutenje *et al.*, 2010), with differences in resource endowments (land, labour, capital) and access to markets and institutions playing a central role in the extent to which diversification occurs (Barrett *et al.*, 2001). The extent of diversification of the household portfolio of activities is determined not only by asset portfolios but also by it having the skills, location, capital, credit and social connections to pursue other activities (Hussein & Nelson 1998). Consideration should also be

given to how assets can be complemented given that some assets are only effective if combined with others (Barrett *et al.*, 2001).

Diversification may also develop as a coping response to the loss of capital assets needed for undertaking conventional on-farm production. As households face decreased availability of arable land, increased producer/consumer ratio, credit delinquency and environmental deterioration, diversification can be an immediate response (Warren, 2002). Consequently, the choices that people employ regarding the use of their asset portfolio in pursuing income, security, wellbeing or other productive and reproductive goals define their livelihoods.

A study by Webb and Block (2001) on diversification in Ethiopia revealed that level of assets owned i.e. livestock ownership is positively and significantly associated with income diversification, even controlling for level of income.

Assets are not only an essential factor of production representing the capacity of the household to diversify but indicators of improved household income. The findings confirm that households surviving the famine with higher than average income and food consumption levels also had a more diversified income base and more valuable assets in hand (especially livestock). In addition, greater income diversification (out of cropping) was positively associated with per capita income level, higher dependency ratio, location in the highlands, and ownership of non-farm assets Warren (2002) points out that diversification can be undertaken with the specific aim of strengthening the

household asset base through accumulating savings needed to expand the land holding, offer education opportunities to the young generation, or insure themselves against illness and aging. This includes diversification occurring as a means to enhance the environmental sustainability of a particular livelihood strategy. However, one of the key questions facing researchers concerned with understanding livelihoods is about how diversification contributes to survival, vis a vis asset accumulation, and the relative proportions of diversification income which are used for consumption versus investment (Hussein and Nelson, 1998). Whilst it can be demonstrated that diversification provides income some of which is used for consumption, but researchers are at odds over the degree to which the remainder is used for investment in assets.

#### **2.2.14.4 Education & Skills**

Educational attainment has been identified as one of the most important determinants of non-farm earnings. The skilled and educated maybe self-employed or can secure stable long-term employment at relatively high salaries, while the unskilled and uneducated depend on more erratic, lower paying casual wage labour in the farm sector. Educational attainment can therefore serve as an entry barrier to better paying nonfarm employment or self-employment in rural Africa. (Barrett *et al.*, 2001) Education is also critical since the better-paid local jobs require formal schooling and that there is a correlation between education with rural non-farm business success (Davies 2004). With the necessary education, migration is more likely to be successful.

In a study on non-farm work and food security in Ghana, Owusu *et al.*, (2011) pointed out that schooling was an important determinant of participation in non-farm work. In particular, education and access to credit were found to be positively and significantly related to participation in non-farm work. However, the same authors note that it is not clear how schooling beyond primary level and the achievement of literacy and numeracy, provides skills that matter in the majority of rural non-farm activities. Since access to education and low wealth status limits opportunities to diversify for poor households (Hussein and Nelson, 1998), diversification can also take the form of investing in human resources in the present in order to diversify the future resource-base of the (parental) household. Several studies have shown that investment in children's education can be a long-term livelihood strategy aimed at creating a source of income transfers for the parents when they reach old age. (Niehof, 2004).

#### **2.2.14.5 Access to Credit Markets**

Constrained access to credit and financial savings can hinder acquisition of assets necessary to diversify out of crop agriculture to non-farm activities.

Restricted access to capital is the major obstacle to investment and entrepreneurship (Davies, 2004). The poor are consequently left with less diversified asset and income portfolios, forcing them to bear both lower returns and higher variability in earnings. Ellis (2000) attributes low rural credit availability to high costs of setting up banking operations in rural areas, the difficulty and cost of securing adequate information on potential borrowers, the

risk of default on loans, and the absence of collateral to put up against loans. This means credit market failures can also provide another motivation for diversifying livelihoods. In the absence of lending facilities, households will engage in activities that generate cash funds to be utilized in purchasing agricultural inputs or farm equipment (Binswanger, 1983; Reardon, 1997, Ellis 2000). Smith *et al.*, (2001) identifies lack of access to financial services or the lack of credit as a constraint to potential diversification into non-farm economic activities in two districts of Kumi and Rakai in Uganda. Despite the number of institutions engaged in this activity, lack of knowledge about credit providers, tight repayment schedules, high initial capital requirements, and the lack of loans for agricultural purposes represent barriers to access.

#### **2.2.14.6 Gender Relationships**

Diversification is also shaped by gender relationships. Women have the potential to undertake a similarly wide range of diversification activities as men, but in many contexts, men are able to avail themselves of diversification opportunities that are not open to women due to cultural constraints (Hussein & Nelson, 1998). Gender relationships can constrain or promote access to some household assets or the mobility of certain gender and age groups. This means that the degree of involvement in diversification activities and the unequal distribution of their benefits vary between genders (Ellis, 2000; Gladwin *et al.*, 2001). A study by Smith *et al.*, (2001) on determinants and patterns of diversification across two districts in Uganda revealed that, “in both districts,

men had a greater degree of occupational livelihood diversification than women. Within the ‘poor’ and ‘average’ well-being groupings, women were mainly engaged in agriculturally-related activities, crop and small livestock production, cottage industries and some farm labouring. The men within these groupings were identified as the most active diversifiers, both in the range of livelihood activities, and the number practiced by individuals.”

Historically African women are known to have been active in combining farm and non-farm income-earning activities as an adaptive strategy during periods of chronic or transitory food insecurity (Devereux, 1999; Maxwell and Frankenburger, 1992). Impediments to effective diversification by women are deeply ingrained in the cultural and socio economic set up in many societies where perceptions are that cash crops and income-earning activities are part of the male domain; while production of subsistence food crops consumed in the household are in the female domain. This means women food producers do not have access to cash from the sale of cash crops with which to buy yield increasing inputs (Due and Gladwin, 1991). African women tend to define themselves by their roles and social identities as the food providers in the household.

Gender is also a factor in the ability to access income-earning opportunities (Niehof, 2004) as women’s ability to engage in income generation is also constrained by time-consuming activities they engage in due to a lack of environmental resources. In a study in Northwest Rwanda Von Braun and

Wiegand-Jahn (1991) discovered that women's opportunities to find additional or alternative sources of income are limited by this external gender division of labour. Women grow food crops for subsistence and market excess food crops, on the other hand men engage mainly in cash cropping and off-farm activities. Fetching water and collecting fuel wood are activities that absorb most of the time of women and children. Gladwin *et al.*, (2001) have argued that though women dominate many of the non-farm activities such as food processing and preparation, tailoring, trading etc., they still face powerful constraints which prevent them from generating much if any cash income. It must still be emphasized that the greater body of evidence suggests that diversification activities open to women are often less lucrative than those pursued by men (Gladwin *et al.*, 2001).

#### **2.2.14.7 Seasonality:**

Seasonality, as an inherent feature of rural livelihoods is evident through varying returns to labour time i.e. income that can be earned during the year in both on-farm and off-farm labour markets (Ellis 2000). Furthermore, Niehof (2004) based on a paper on how the seasonal calendar explains the timing of migrant labour in India indicates that in rural communities the need for and possibilities of livelihood diversification depend on seasonal time. Seasonality causes changes in occupation to occur as labour time is switched from lower to higher return activities (Alderman and Sahn, 1989). For this reason, an important motive for income diversification associated with seasonality is to

reduce seasonal income variability which then requires income earning opportunities which are not synchronized with the farm's own seasons. Livelihood options for households that are influenced by seasonality include seasonal migration to other agricultural zones, circular or permanent migration to non-farm occupations (Alderman and Sahn, 1989).

#### **2.2.14.8 Adaptation to Risk**

One rationale for diversification is to create a portfolio of livelihoods with different risk attributes. (Hussein and Nelson, 1998; Reardon and Vosti, 1995). This implies that diversification may mean that households accept lower economic returns as long as there is greater security and lesser risk. Previous experience of crop or market failure can provoke diversification as a means of spreading perceived risk and reducing the impact of total or partial failure on household consumption (Warren, 2002). However such a decision may compromise productivity gains from specialisation. In situations where there are decreasing or seasonally varying returns to labour or land; imperfect markets for assets, finance and commodities, diversification can be an immediate response (Barrett *et al.*, 2001). With diversification, risk adverse households may choose the second best income-generating alternative which entails giving up a certain amount of income by diversifying rather than face a total failure hazard (Warren, 2002). An example drawn from drought shocks of the mid-1980s in Burkina Faso reveal that households' capacity to cope with were strongly associated with the extent of their non-farm diversification

patterns (Webb and Reardon, 1992). Therefore diversification may be a response to shocks to income such as crop failure or livestock losses which may force households to reallocate labour to other pursuits, such as wage labour, informal employment off-farm or nonagricultural activities on-farm (e.g. weaving, beer brewing).

According to Ellis (2000) whether or not risk spreading involves a fall in income, one of the critical motives of livelihood diversification for risk reasons is “the achievement of an income portfolio with low covariate risk between its components.” Put simply, this means a household will try to ensure that the factors that create risk for one income source are not the same as the factors that create risk for another income source. Diversification on the farm whereby a farmer takes advantage of differences in the risk-proneness of crops to adverse weather is only partial. By contrast non-farm livelihoods also help in ensuring low risk correlations between livelihood components.

#### **2.2.14.9 Local Economic Boom Opportunities**

Ellis (2000) points out site-specific opportunities such as local market contingencies, development projects, infrastructure development which play an important role in pulling rural household towards livelihood diversification.

High returns to local nonfarm activities tend to occur in regions where there are booming activities in agriculture, mining, or tourism. Consequently consumption and production-linkages with the nonfarm sector are created which swell up demand for nonfarm goods and services (Readon *et al.*, 2006).

The interplay among factors such as market dynamics and social capital assets often play a major role in generating opportunities for livelihood diversification.

#### **2.2.3.15 Livelihood diversification approaches**

Moser (1998) argues that livelihood approaches “identify what the poor have rather than what they do not have” and “strengthen people own inventive solutions, rather than substitute for, block or undermine them”. Therefore, “such approaches look positively at what is possible rather than negatively at how desperate things are” (Ellis, 2000). Where conventional poverty reduction policies focused narrowly on, for example, increasing employment, incomes and/or productivity, livelihood approaches consider a multiplicity of vital aspects of poverty such as vulnerability. These include factors and processes that either constrain or enhance poor people’s ability to make a living in an economically, ecologically, and socially sustainable manner. In this light, income and production become a means to improve livelihoods, rather than ends in themselves. Throughout both the academic literature and development practice, different specifications have evolved, which emphasize distinct aspects and entry points. However, according to Arun *et al.* (2004), one can identify common principles. Livelihood approaches are people-centered, holistic, and they build on strengths. Furthermore, as change accelerates in every domain of human life, which requires a continuous adaptation of a highly

diverse portfolio of activities to manage, cope and adapt to new livelihood challenges, a dynamic perspective has to be applied.

The livelihood approach incorporates an analytical framework providing a broad and systematic understanding of the various factors that constrain or enhance livelihood opportunities. The approach build on some well developed field level tools and methods, such as participation and empowerment. The livelihood approach is a very useful tool for analysing the opportunities and constraints that people may have in all aspects of their lives (Messer & Townsley, 2003). The livelihood approach aims to give a better understanding of the lives of people by means of identifying the main factors which affect their livelihoods. This approach is portrayed as providing a multidisciplinary and more comprehensive analysis, as opposed to other approaches which, for example, only have an economic focus (De Haan, 2006). The livelihood approach is lauded for adding human capital and social capital to the analysis, where previous approaches were limited to conventional resources like infrastructure, livestock and land. Moreover, it emphasized the importance of “flexible combinations of, and trade-offs between, different capitals” (De Haan & Zoomers, 2005).

The livelihoods approach has played an important role in highlighting the multiple activities undertaken by rural households, the importance of assets in determining the capacity to undertake activities, the dynamic nature of the actions of rural households and the link between the diversification of assets

and activities (Barrett and Reardon, 2000). It also emphasizes the role of the households' resources as determinants of activities and highlights the link between assets, activities and incomes. The livelihood approach focuses on people and the realities poor people face. Under this approach, people's strengths rather than their weaknesses and needs are emphasized. The livelihood approach is optimistic- it examines the ways that people have creatively adapted to their circumstances, rather than seeing people as passive victims heading towards a destitute future. The livelihood approach is less dependent on aggregated economic measures of poverty that have wide application across regions, and focuses more on people's survival strategies in local and specific contexts. "The central objective of the livelihood approach was to search for more effective methods to support people and communities in ways that are more meaningful to their daily lives and needs, as opposed to ready-made interventionist instruments" (Appendini 2001). The livelihood approach seeks to understand changing activity combinations, and the cause and effect processes of livelihoods in a dynamic and historical context. This holistic perspective incorporates the complexity of human struggles and examines poverty from multiple dimensions.

### **2.3 Empirical Literature**

According to Oseni and Winter (2009), more than 80% of the rural households in Nigeria relate their poverty status to problems in the agricultural sector and

specifically to lack of inputs and not being able to afford inputs such as fertilizer and seeds. To overcome this problem, farm households often diversify their livelihood from farm into off-farm activities. Oxford policy management (OPM) (2004), reports that the majority of households across all income strata in Nigeria are involved in several off-farm activities, whose importance has increased over the last 25 years. The report suggests that non-farm activities account for an average of 36% of adult working hours per annum and 60% of cash income. Meagherm (1999) explained that non-farm activities in Nigeria are diverse, partly seasonal and often performed within the family compound. They include, but are not limited to, agroprocessing, snack and food making, transport, retail, household trade and tailoring. In a similar way, Okali *et al.* (2001) found that income diversification is increasing in the rural areas through the sub-urbanization of individual activities like paper mills, packaging and home construction activities.

The study by Oseni and Winter (2009) found that 31% of farm households in Nigeria participate in various non-farm activities and that non-farm income makes up 27% of total annual household income, on average. The authors indicated that southern households earn more from non-farm activities than northern households where about 50% of household income is from non-farm sources. According to Ibekwe *et al* (2010), more than 40% of the income from households in South Eastern Nigeria came from off farm activities. Non-farm self-employment is the most common forms of off-farm activities in Nigeria

followed by non-farm wage employment (Oseni and Winter, 2009). The most common types of self-employment are those in commerce and manufacturing, including retail trade, oil refining, hotel and restaurants, passenger transportation, food processing, textile, food selling and quarrying. Among non-farm wage employment, professional and clerical jobs are the most common in Nigeria (Oseni and Winter, 2009).

Ellis (2008), studied the diversity of rural livelihoods in low income developing countries for exploring the reasons for the adoption of multiple livelihood strategies. The study made distinction between diversification by choice and that of necessity. For this purpose six determinants of diversification i.e. seasonality, risk, labour markets, credit markets, asset strategies, and coping strategies were considered. The study found that under the precarious conditions that characterize rural survival in many low income countries, diversification has positive attributes for livelihood security that outweigh negative connotations it may possess. The study concludes that diverse rural livelihoods are less vulnerable than undiversified. The author recommends that policy should facilitate the rural people for diversification and not for diversity.

Nicol (2004), studied the conditions and the ways in which rural households diversify their livelihood activities and strategies. This study revealed that diversification plays a strategic role in rural livelihood systems. The author pointed that specific attention is needed to perspectives i.e. gender perspective, a temporal perspective, that may shed new light on the issue of rural livelihood

diversification. The study recommends the use of multi income generation activities for better wellbeing and livelihood.

Oladeji *et al.* (2006), investigated the income generating activities of Fulani women in Iseyin Local Government Area of Oyo State. The study revealed that majority of women was rearing cattle. The most prominent income generating activities of Fulani women was milk processing, followed by mat weaving and wages labour. None of the Fulani women's personal characteristics such as age, marital status, marriage pattern, household size, education and religion affect or influenced their income generating activities. The study recommended that Fulani women should be organized into group for training on other income generating activities by extension institutions in order to broaden their horizon of such activities.

Omotesho *et al.* (2007), studied rural food security and poverty in Nigeria. The study used discriminate analysis to examine the levels and the major determinants of food security and poverty among the rural households who were the major producers of food in Nigeria. Using the basic calorie and protein requirement per capita of households, the study revealed that accessibility to health facilities; household size, farm size and household expenditure on food were the major determinants of a household's food security status. Non-farm income was a major determinant of the probability of a household being non-poor. The study suggested family planning; specific

programmes targeted the rural poor and food insecure as policy options for better and sustainable livelihood.

Adi (2005), examined the determinants of livelihood diversification from agriculture and the manner in which different agro-ecological determinants affect such diversification in rural communities of eastern Nigeria. The author found that majority of the households remained diversified as they combine activities within farming, commerce, skilled non-farm and low skilled non-farm sectors. Both human capital and the agro-climatic variables were found to determine the nature of diversification. The main finding of the study was that despite high incidence of diversification, agriculture was still important source of livelihood. Development policies must give equal importance to agriculture development for the development of the rural areas.

Agbola *et al.* (2008), studied income diversification and food insecurity in the farming household of Osun State of the Southwestern Nigeria. They found that income diversification strategies have significant influence on food insecurity. Households that depended more on off-farm income ranked the best, having the highest surplus index of 0.71 and the least shortfall index of 0.21. The study also found that households that rely solely on crop production ranked the least. The findings showed that income diversification strategies of the households involved combinations of crop production with livestock rearing, crop production with off-farm activities, off-farm activities with livestock enterprises and crop production only, at 60.0%, 10.0%, 8.0%, and 22.0% of

households respectively. It was found that food insecurity among farming households was influenced by Income diversification strategies. Similarly Barrett *et al.* (2008) studied income diversification and livelihoods in rural Africa. They found that asset, activity and income diversification lay at the heart of livelihood strategies.

Babatunde (2008) analyzed income inequality by using Gini coefficient among farm households in rural Nigeria. The result of the study showed that the overall Gini coefficient of income inequality was 0.40. The study pointed out that agricultural wage, non-agricultural wage and self-employed income increase inequality while remittances, pensions and capital income, and other incomes decrease income inequality. It was evident from the main findings of the study that farm income contributes about 35% while off-farm income contributes 61% to total inequality. Crop income contributing about 33%, contributes more to total income inequality than any other income source. This is followed by self-employed income, which contributes 32% to total income inequality. To decrease income inequality among the rural poor there is a need to provide better off-farm employment opportunities, education and access to credit markets coupled with physical infrastructures that would create more economic opportunities for them.

Delgado and Siamwalla (2006), studied the adoption of alternative income generating activities and farm-level diversification of households in developing countries of the world. The study pointed out that farm diversification might be

a desirable outcome of pursuing a market liberalization objective. In most Sub-Saharan African countries development depended on proactive commercializing due to less diversification in farm sector in rural areas. They showed that African farmers diversified their farm activities by producing one or two marketable and exportable commodities as a source of alternative income. The main hurdle in the way of diversification was the lack of information and poverty. The study recommended identification of appropriate rural institutions that could help the rural people into exploring new export opportunities.

Winters *et al.* (2008), explored rural wage employment and its potential as a mechanism for improving the well being of the rural population by using nationally-representative data from 14 developing countries. Findings of the study showed that farm and off farm employment and the household livelihood strategy appeared to be of limited importance in determining a household uses wage employment as a pathway out of poverty. The research showed that high productivity wage employment appears to be linked to the underlying assets of the household and its individual members. The analysis also suggested that considering gender was very important in participation in labour markets. The study recommends that educational and infrastructure investment was critical for providing opportunities in the labour market that led to higher wages.

## 2.4 Analytical Framework

### 2.4.1 Logit Model

A logistic (logit) regression model was employed in this study to verify the relative contribution of factors that determine livelihood diversification strategy among Fadama and Non-Fadama users in Imo State. The logit model involves estimating a dichotomous (qualitative) response model. The model begins with the cumulative logistic function

\_\_\_\_\_ eqn. (2.1)

This can be rewritten as

\_\_\_\_\_ eqn. (2.2)

Where:  $P(Y=1|X)$  is the probability that a household (i.e.  $Y=1$ ), is diversified, given its socioeconomic characteristics  $X$ . The probability that the household is not diversified  $P(Y=0|X)$  (probability of an event not occurring) that is  $Y=0$  is then presented as

\_\_\_\_\_ eqn. (2.3)

Therefore we can write the odds ratio as

\_\_\_\_\_ eqn. (2.4)

Equation (2.4) is simply the odds ratio-the ratio of the probability that Fadama or non Fadama users is diversified to the probability that they are not

diversified. However, eqn. (2.4) is nonlinear in the parameters, but taking the natural logarithm results in

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eqn. (2.5)

Eqn.(2.5) is the log likelihood function. L the log of odds ratio is not only linear in X but also in the parameters. The study first estimated eqn. (2.5) to obtain the log odds ratio. The parameters in eqn. (2.4) were retrieved from the estimated coefficients in eqn. (2.5). Because the log of odds ratio ordinarily does not make any sense the study relied on eqn. (2.4) for analysis.

=1 if Fadama or Non-Fadama users are diversified and 0 otherwise.

$\beta'$  is a vector of parameters to be estimated.

X is a vector of explanatory variables comprising of household size, gender, age, education level, cooperative membership, access to credit, and land ownership.

#### **2.4.2 Measuring Income Inequality:**

Inequality can be conceptualized as the dispersion of a distribution, whether one is considering income, consumption, or some other welfare indicators. It is a logical outcome of market economy, which is made up of structures and institutions such as businesses, formal and informal organizations, all of which serves as avenue for socio-economic integration. Income inequality is often studied as part of broader analyses covering poverty and welfare. Income is detrimental to economic growth and development, because it aggravates

poverty, and this is why it is important to measure and monitor its level from time to time, (Babatunde 2008).

Income inequality can be measured in different ways like Generalized Entropy, Theil's index, Dalton's index, Atkinson index, Gini Coefficient, Lorenz Curve, Quintile method, Kuznet Ratios, and Coefficient of variation. All these methods are equally important. But for the purpose of this study, Gini-coefficient was used.

#### **2.4.2.1 Gini -Coefficient as a measure of income inequality**

Gini coefficient is a popular measure of income inequality defined as the ratio between the area enclosed by the line of equality and the Lorenz curve and the total triangle area under the line of equality. For calculating Gini coefficient different formulas was used by Ghimire (2007), Baral (2007), Chhetri (2005) and Jenkins (1999). Due to comparatively easy computation in this study the Gini coefficient is calculated by the formula of Kendal and Stuart (1977) cited in Obasi (2000). The model is specified below as

$$G = \frac{\bar{d}}{2\bar{Y}} \quad \text{eqn.(2.6)}$$

Where

$$\bar{d} = 2 \sum_{i=1}^k \{N'(X_i) [1 - N'(X_i)] (\bar{X}_{i+1} - \bar{X}_i) \} \quad \text{eqn.(2.7)}$$

G = Gini coefficient of income sources

$\bar{d}$ = Coefficient of mean income differences among users

$\bar{Y}$  = grand mean income of users

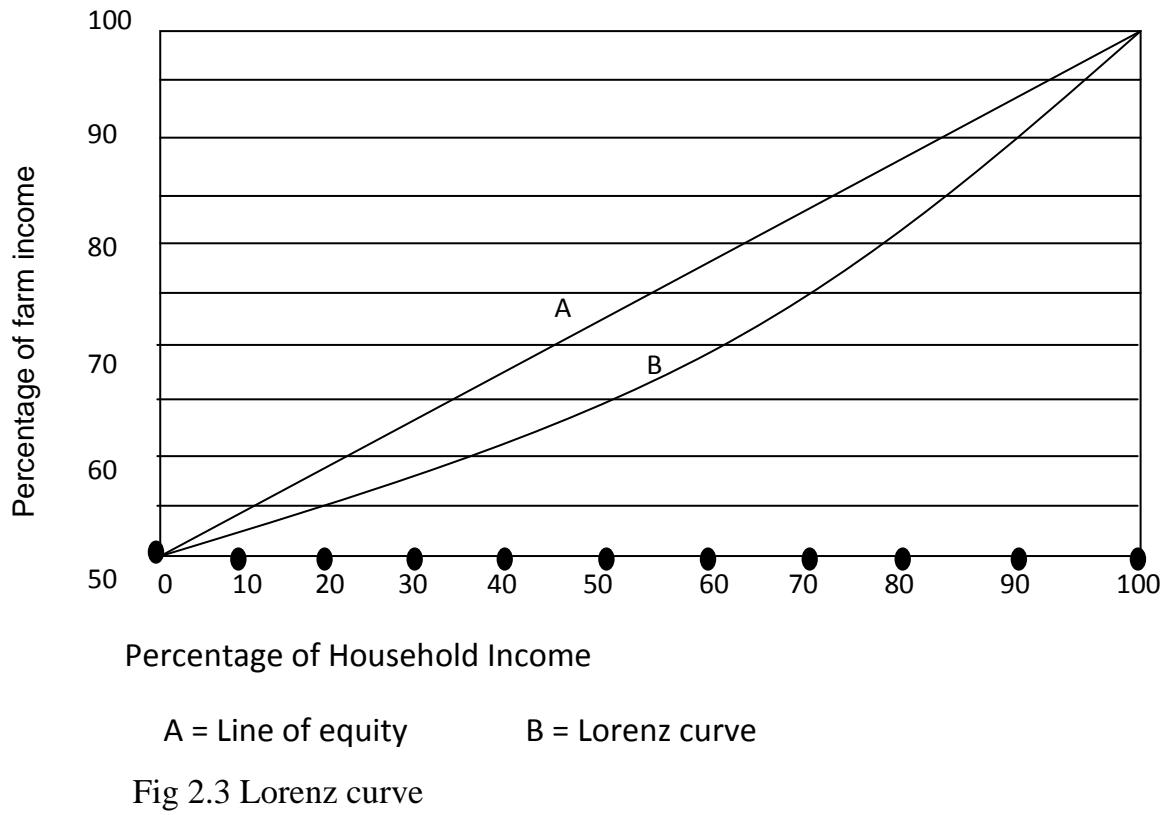
$\bar{X}_i$  = mean income of the  $i$ th class of income of users

$N'(X_i)$  = cumulative number of relative frequency of income earners up to the  $i$ th class of income

$K$  = number of income class

#### **2.4.2.2 Lorenz Curve as a measure of income inequality**

Lorenz curve is also one of the important measures of income inequality. The income inequality among the rural household can be presented by drawing the Lorenz curve diagram. The deviation of the line from the strait line in the Lorenz curve shows the inequality of income in the household income. Larger deviation of the line from the line of equality, represent higher inequality. The Gini coefficient (or Gini ratio) can easily be illustrated by the Lorenz curve that is an effective way of showing inequality of income within and between countries. The cumulative percentage of population is plotted along the horizontal axis while, the cumulative percentage of income is plotted along the vertical axis. The curve shows the actual relationship between the percentage of income recipients and the percentage of income that they did in fact actually receive. It also represents the ratio between the diagonal and the Lorenz curve over the area of the triangle under the diagonal. The equality line example of the Lorenz curve is presented as follows:



#### **2.4.2.3 Quintile method as a measure of income inequality**

In quintile method the household's income are divided into quintiles such that each quintile represents 20%, or one fifth, of the household income. The household income quintiles are classified from lowest to highest as bottom fifth, lower middle, middle, upper middle, and top fifth. This will show the wealth concentration of the household income. The household are classified on the basis of quintile according to the income level and concentration of income. This quantifies that how much of the household income is distributed between the poorest, poor, middle and middle rich and the richest classes of household. The ratio of income between the lowest quintile of income to the highest quintile gives magnitude of the income.

### **2.4.3 Aggregate household income Model**

Total income of household is the sum of all incomes from farm and off farm activities. These include income from crops yield, daily wage (agriculture and non-agriculture), rental land, livestock, fruits, forest, farm machinery, vegetable, trade and commerce, services, remittance (both foreign and domestic), pension etc. Ibekwe (2001) adopted the cash income model, which include aggregated as value of farm income less cost, value of non-farm income less cost, imputed values of farm output not sold and imputed values of non-farm activities not sold less cost. This study has modified Ibekwe (2001) model to include some imputed values that were relevant to household aggregate income among Fadama and non Fadama users. It also removed the imputed cost of farming activities not sold because they have been already accounted for as cost of farming activities by the farmer.

**Net Cash Income** = Farm Income less Cost of farming + Off farm income less cost of off farm activities +Imputed farm values less cost + Imputed values for off farm activities less cost. The model is further modified to accomodate aggregate household income. The aggregate household income is thus expressed as;

$$\text{AGRGGATE HOUSEHOLD INCOME} = \text{FIN} + \text{OFIN} + \text{K} + \text{V} \quad \text{eqn. (2.8)}$$

**Where**

$$\text{FIN} = \text{Net Farm Income (TR} - \text{TC})$$

**TR** = Sales receipts from farm produce

**TC** = Total purchase of farm production.

**OFIN** = Net Off-farm income

**K** = Imputed values for farm income

**V** = Imputed values for off-farm income

However, the value of **FIN** is expressed as

**FIN** = Total Sales (Receipt) – Total purchases

$$\text{FIN} = (X_1 + X_2, \dots, X_5) - (Y_1 + Y_2, \dots, Y_5) \quad \text{eqn.(2.9)}$$

Where

$X_1$  = sale of crop produced by the farmer

$X_2$  = sale of livestocks reared by the farmer

$X_3$  = Permanent crops (Forest/Trees) rented out or sold

$X_4$  = Land rented out or sold

$X_5$  = Interest on loans and advances given out by the farmers

Less Cost of farming activities ( $Y_i$ )

$Y_1$  = Hired labour

$Y_2$  = Cost of transporting produce for sale

$Y_3$  = Cost of planting materials, general farm maintenance and soil amendment practices and pesticides/herbicides etc.

$Y_4$  = Depreciation of fixed inputs/farm tools

$Y_5$  = Rent on land/barns on rentage

## **Plus**

**OFIN = Net Off Farm Income = TR – TC**

**TR = Sales** receipts from off farm activities

**TC = Total** purchase of off farm activities.

**OFIN = Total Sales – Total purchase**

$$\text{FIN} = (X_1 + X_2, \dots, X_6) - (Y_1 + Y_2, \dots, Y_7) \quad \text{eqn.(2.10)}$$

Where

$X_1$  = Interest received in cash from off-farm loan

$X_2$  = Off farm service earnings-salaries,wages, pensions etc

$X_3$  = Sale of purchased crop or produce not obtained from the farm

$X_4$  = Sale of purchased animals and animals products not obtained from the farm

$X_5$  = Sale of tools and fertilizers purchased and not used for farm activities

$X_6$  = Sale of non-farm products.

## **Less**

$Y_1$  = Purchase of crops and crop products for sale

$Y_2$  = Purchase of insecticides, planting materials, tools and fertilizer for later resale.

$Y_3$  = Cost of non-agricultural trading items

$Y_4$  = Cost of animal and animals products for resale

$Y_5$  = Cost of transporting/storage/processing all traded items

$Y_6$  = Interest paid on non-farm loans received

$Y_7$  = Depletion of inventories of trade crops, animals, animal products and non-agricultural items.

### **Plus**

**K = Net Imputed Value for farm produce not yet sold**

$$K = TR_K - TC_k \quad \text{eqn.(2.11)}$$

$$TR_K = (X_1 + X_2, \dots, X_5)$$

$$TC_K = (Y_1 + Y_2, \dots, Y_7)$$

$$K = (X_1 + X_2, \dots, X_5) - (Y_1 + Y_2, \dots, Y_7)$$

Where;

$X_1$  = Imputed value of fields and tree crops not harvested nor rented

$X_2$  = Value in kind of land rented out (shadow value)

$X_3$  = Value in kind for trees rented out (shadow)

$X_4$  = unsold livestock/crops unharvested (inventories)

$X_5$  = interest received in-kind on farm loans

### **Less**

$Y_1$  = Seeds and cuttings planted (given out in kind or as transfer)

$Y_2$  = Fertilizers applied (given out in kind or as transfer)

$Y_3$  = Kind payments for hired labour (given out in kind or as transfer)

$Y_4$  = Depreciated fixed input (given out in kind)

$Y_5$  = kind payment for land rented or purchased

$Y_6$  = kind payment for trees rented or purchased

$Y_7$  = Interest paid on farm loans paid in cash

**V = Net Imputed Value for off farm activities not yet sold**

$$V = TR_V - TC_V \quad \text{eqn.(2.13)}$$

$$TR_V = (X_1 + X_2 + X_3)$$

$$TC_V = (Y_1)$$

$$V = (X_1 + X_2 + X_3) - (Y_1)$$

Where

$X_1$  = Kind payment for off farm service work

$X_2$  = Interest on non-farm

$X_3$  = Increase in inventories of traded crops, animals, animal products and non-agricultural items.

$Y_1$  = Kind payment for purchase of crops, animals and animal products.

**Therefore**

Aggregate Net Household income = Net Cash Value + Net Imputed Value

For measurement of total household income, all the calculation about income were made at household level. Incomes both from farm and off farm activities will include both monetary or in kind that is received by the household or by individual members of the household at annual or more frequent intervals, but excludes irregular income. The net income from an activity is obtained by subtracting the cash expenses incurred in production from the gross income. Ellis, (2000) stated that household income is the output of activities it measures both cash and in-kind contributions. All the goods and services produced will

be valued at market prices regardless of their use. So, all own-farm products will be valued at the same price as if they were sold.

#### **2.4.3.1 Calculating household income from farm activities**

For present study income from farm activities were divided into crop, livestock, fishery, forest (timber, fire wood etc.), and rented out land, agriculture wages, fruits, vegetables, orchards, plantation, and farm machinery income. The procedure for calculating the total income from mentioned sources for each sampled rural household is as follow.

##### **2.4.3.1.1 Crop income**

Data for crop income were collected at field level. To collect data for crop income the households were asked to provide the yield and the input expenditures of the annual last crop. The gross income from crop production is obtained as the sum of all crops produced during the one year period and was valued using producer price. The crops will include; maize, cassava, yam, okra, melon, etc. To calculate the crop income an enquiry were made about the total farm production at household level from the individuals having farm production, and then the production were multiplied with the local market price for the total income from the crop.

#### **2.4.3.1.2 Income from fruits,**

This included income from the sale of orange, mango, pea, etc for calculating this category of income, the farmers would be asked to supply the amount they earned from the fruits in the last one.

#### **2.4.3.1.3 Income from orchards**

This included income from the sale of orchard products like pineapple,

#### **2.4.3.1.4 Plantation**

This included income from the sale of plantation products like palm fruit, plantain, banana etc.

#### **2.4.3.1.5 Vegetables**

The production of vegetables is not always on commercial basis, but mostly used for home consumption. Due to problems in income calculations from vegetables only the household earning of last one year were recorded.

#### **2.4.3.1.6 Farm machinery income**

Farm machinery income was recorded as reported by the household for one year.

#### **2.4.3.1.7 Livestock income**

This included income from the sale of livestock and their products i.e. egg, poultry manure and products.

#### **2.4.3.1.8 Forests income**

This consists of income from timber, fire wood, and non timber forests products e.g. snail, honey, palm wine, bush meat etc getting by the households

from the forests available in the area. Due to problems in valuing the forest products gathered for home consumption, forest products income contained only the income from the sale of forests products during the last one year.

#### **2.4.3.1.9 Fishery income**

This included income from sale of fish harvested from pond less the expenses incurred during production. Income generated from sale of fish by fisher men will also be included.

#### **2.4.3.1.10 Rental income of land**

Rented out land income were recorded on annual basis.

#### **2.4.3.1.11 Daily wage income**

This included the sum of incomes of the household members received by working on daily wage basis in the farm and off farm activities.

### **2.4.3.2 Calculating the household income from off-farm activities**

This included income from small scale business, public and private services income, remittances income (foreign and home), daily wages income, pension income and income from other sources. Small scale business income includes all cash and in kind earnings of the household from business in one year. Services income includes income from all the services performed by the individual members of the household in public or private sector. Remittance income was divided into two categories i.e. home and foreign. Home

remittances comprised of all those remittance from family members within the state and are sending such to support the livelihood of their family.

Foreign remittance is that remittance from individuals who have migrated to other states or foreign countries.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 The Study Area**

This study was conducted in Imo state, Nigeria which is among the states in Nigeria that benefited from the National Fadama Development project. Imo State lies between Latitude  $5^{\circ}10'$  and  $6^{\circ}35'$  North of the equator and between Longitude  $6^{\circ}35'$  and  $7^{\circ}31'$  East of the Greenwich meridian. The State has a population of about 3,934 million people disaggregated into 2,032 males and 1,903 million females (NPC, 2006). It is bounded on the East by Abia state, on the North by Anambra and Abia State, and on the West by Rivers State. The State is divided into 27 administrative units called Local Government Areas which are grouped into 3 agricultural zones viz Owerri, Okigwe and Orlu. Fadama II was implemented in 11 local government areas of the state, while Fadama III is being implemented in 20 local government areas of the state. Agriculture is the predominant occupation of the people, for almost all the farm families either as primary or secondary occupation. The ecological zone favours the growing of tree crops, roots and tubers, cereals, vegetables and nuts. (Onyenwaku *et al*, 2010).

The climate of this ecological zone is characterized by two marked seasons, the dry season experienced between November- February and the rainy season from March to late October, with a brake in August and early September. There is dry, cold and dusty wind known as the harmattan, which is often experienced between December and January. The annual precipitation ranges from 1800mm

to 2400mm. Annual daily mean air temperature is about 28°c. The relative humidity reaches 90% during the night and 72% during the day. The driest and coldest months are December and January, while the hottest month is usually March (Cochita, 2008).

The vegetation is determined by economic trees like the Iroko, Mahogany, Obeche, Gmelina, Bamboo, Rubber, and oil palm predominate. But due to high population density, most parts of the state have been farmed and degraded that the original vegetation has disappeared. Thus, farmers are forced into marginal lands, a situation aggravated by the rising demand for fuel wood. Deforestation has triggered off acute soil erosion in most of the local government areas of the state. The high population density of the state has led to intensified pressure on land, forest and other natural resources, leading to increasing rural poverty, which is a characteristic of densely populated rural areas. Fallow period rarely exceeds one year and in some areas continuous cropping is the practice. Low crop yield and loss of land to erosion have combined to induce people to migrate in search of jobs and even farmlands in other parts of the country. Oil, gas and solid minerals are available in some local government area of the state in large and commercial quantities and offers inherent opportunities for intending investors in the sector. Imo State is the only state in south east and south south that implemented both Fadama I, fadama II and Fadama III projects in the country. The state is endowed with land suitable for growth of various tropical crops and rearing of various livestock.

The major crops cultivated in the state are maize, melon, rice, groundnut, vegetables, yams, cassava, oil palm, and rubber. Major animals reared include chicken, turkey, goats, sheep and pigs.

### **3.2 Sample Selection**

The population for our study encompassed the beneficiaries of Fadama II, and Fadama III and their non beneficiaries. Fadama II was implemented in 11 LGAs in the state, namely: Ohaji/Egbema, Orlu, Oguta, Nkwere, Owerri North, Ahiazu Mbaise, Aboh Mbaise, Ngor Okpala, Ihitte Uboma, Ehime Mbano and Onuimo, while Fadama III was implemented in 20 LGAs of the State. They include; Ohaji/Egbema, Oguta, Nkwere, Orsu, Oru East, Oru West, Isu, Njaba, Owerri North, Owerri West, Ngor Okpala, Ahiazu Mbaise, Aboh Mbaise, Mbaitolu, Isiala Mbano, Ehime Mbano, Okigwe, Onuimo, Ihitte Uboma and Obowo. There are 33,333 farm households in Imo State (Imo ADP, 1988). These include both fadama and non fadama beneficiaries in the state. Samples for this study were drawn from these farm households. Multistage random sampling technique was used in the selection of the sample. In stage one, two Local Government Areas (LGAs) that participated in both Fadama II and Fadama III were purposively selected from each agricultural zone. They include; Ohaji/Egbema and Ngor Okpala for Owerri zone; Onuimo and Ihitte Uboma for Okigwe zone; Nkwerre and Oguta for Orlu zone. In the second stage, 5 Fadama community Associations (Obosima, Obitti, Mgbirichi, Umuokanne, and Awarra/Ikwerrede for Ohaji/Egbema; Nguru Umuarto, Obingwu, Umuhu, Ihitte/Umukabia and Eziamaka for Ngor Okpala; Okwelle, Owerre Okwe, Ezelu, Umuanumeze/Ozimo

and Umuduru/Egbeaguru for Onuimo; Onicha Uboma, Ikperejere, Nkwumeato, Amakohia/Umuezegwu and Amanyinta for Ihitte Uboma; Okwuamanano, Ndinkwerre, Umukor Nanano, Amaokpara Eziam and Amaise for Nkwerre; Agwa clan 1, Amaeshi, Awa, Okene and Akabor for Oguta. ) (FCAs) were chosen randomly from each of the selected local government areas, thus giving a total of 30 Fadama Communities Associations. The third stage involved random selection of 5 Fadama user groups (FUGs) from each of the 30 Fadama communities Associations making a total of 150 FUGs. In the 4<sup>th</sup> stage, a member of the Fadama user group (FUG) was chosen randomly from each of the selected Fadama User Groups, thus giving a sample size of 150 Fadama respondents. In order to study uniform number of parallel respondents, 150 non Fadama users were drawn randomly from the same thirty (30) communities where the Fadama community associations and fadama users groups were chosen (5 non Fadama users from each community), bringing the cumulative sample size of 300.

### **3.3 Data Collection**

Primary and secondary sources of data were used. The primary data were collected with validated and structured questionnaire that was administered through face to face interview method. Primary data were collected on variables such as household income, livelihood diversification strategy, value addition, age, level of education, household size, farm size, cooperative membership, primary occupation, gender, land ownership, farming experience, access to credit.

The secondary data sources included SFCO reports (especially of monitoring visits and supervision mission), financial records of FUGs, government and non-governmental organizations assessment reports. Cost route approach of data collection was used.

### **3.4 Data Analysis**

Both qualitative and quantitative methods were used to analyze data. The qualitative analysis was based on the perception of the respondents on the determinants of Household income, livelihood diversification and value addition in the study area. The quantitative method comprised descriptive statistics such as: average, percentage, frequency distribution and charts; net farm income model, multiple regression analysis, logit model, Gini Cofficient model, F- test, z- statistics etc.

Objective (I): to analyse the socioeconomic characteristics of Fadama and non-Fadama users in the study area.

This objective was achieved using descriptive statistics such as mean and percentages.

Objective II; to identify the main income generating activities and their income share in the study area,

This objective was achieved using descriptive statistics such as means and percentages.

Objectives (III): to analyse the aggregate household income, its determinants and income distribution among Fadama and non Fadama users in the study area.

According to Ibekwe (2001), net cash income was achieved using net farm income model. The model is as specified below;

**Net Cash Income** = Farm Income less Cost of farming + Off farm income less cost of off farm activities +Imputed farm values less cost + Imputed values for off farm activities less cost. The model is further modified to accomadate aggregate household income. The aggregate household income is thus expressed as;

$$\text{AGRGGATE HOUSEHOLD INCOME (Y)} = \text{FIN} + \text{OFIN} + \text{K} + \text{V} \text{ eqn.(3.1)}$$

**Where**

$$\text{FIN} = \text{Net Farm Income (TR} - \text{TC}) \quad \text{eqn. (3.2)}$$

**TR** = Sales receipts from farm produce

**TC** = Total purchase of farm production.

**OFIN** = Net Off-farm income less cost

**K** = Imputed values for farm income less cost

**V** = Imputed values for off-farm income less cost

**Therefore;**

$$\text{Aggregate Net Household income (Y)} = \text{Net Cash Value} + \text{Net Imputed Value} \text{ eqn.(3.3)}$$

The second part: income share of Fadama and non-Fadama users in the study area. This part was achieved using percentages.

The third part: determinant of household income among Fadama and non Fadama users in the study area.

This part was achieved using the ordinary least square multiple regression analysis. The ordinary least square (OLS) model is implicitly specified as;

$$Y = F(X_1, X_2, X_3 \dots X_7, U) \quad \text{eqn (3.4)}$$

Where

$Y$  = Aggregate Net household income (₦)

$X_1$  = household size (number of persons)

$X_2$  = gender (dummy variable, 1 for male, 0 for female)

$X_3$  = Age of the farm household head (years)

$X_4$  = Education level (number of years spent in school)

$X_5$  = Total farm size (Hectares)

$X_6$  = farming experience (years)

$X_7$  = land ownership (dummy variable 1 for land owner, 0 for tenants)

The a priori signs of the  $X$  variables ( $X_1 \dots X_7$ ) were expected to be positive, except for  $X_1$  (Age) which is expected to change to negative sign after retirement age of the household head. The different functional forms were fitted in and the equation that gave the ‘best fit’ was then selected as the lead equation based on conformity with apriori expectations(expected signs of the estimators, the magnitude of the coefficient of multiple determination ( $R^2$ ), and the statistical significance of the parameter estimates) (Olayede 1982). However, since the Linear and Semi-log functions cannot be compared directly with the Double-log and Exponential functions on account of the specification of the dependent variable in both the Double-log and Exponential functions (Olayemi 1981), the Linear and Semi-log functions were transformed to make them directly comparable with the Double-log and Exponential functional forms.

Folowing Obasi *et al* (2013), the dependent variable in the Linear and Semi-log forms were transformed thus:

$$Y_t^* = CY_t$$

Where  $Y_t^*$  = transformed dependent variable

$C$  = reciprocal of the geometric mean of  $Y$  values

$Y_t$ = original values of  $Y$  in period  $t$

Four functional forms of the model presented explicitly in equations 3.5 – 3.8 were tried so as to select the lead equation on the basis of producing the highest  $R^2$ , highest significant variables and conformity to aprori expectation.

1. The Linear Regression Form:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_7X_7 + U, \quad \text{eqn (3.5)}$$

2. The Double-log Functional Form:

$$\ln Y = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + \dots + b_7 \ln X_7 + U_i \quad \text{eqn (3.6)}$$

3. The Semi-log Functional Form:

$$Y = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + \dots + b_7 \ln X_7 + U_i \quad \text{eqn (3.7)}$$

4. The Exponential Function Form:

$$\ln Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + \dots + b_7 X_7 + U_i \quad \text{eqn (3.8)}$$

The fourth part: to analyse the income distribution among fadama and non-fadama users in the study area.

This part was achieved using Gini Cofficient of income distribution following Kendal and Stuart (1977) cited in Obasi (2000). The model is specified below as;

$$G = \frac{\bar{d}}{2\bar{Y}} \quad \text{eqn.(3.7)}$$

Where

$$\bar{d} = 2 \sum_{i=1}^k \{ N'(X_i) [1 - N'(X_i)] (\bar{X}_{i+1} - \bar{X}_i) \} \quad \text{eqn.(3.8)}$$

$G$  = Gini coefficient of income sources

$\bar{d}$  = Coefficient of mean income differences among users

$\bar{Y}$  = grand mean income of users

$\bar{X}_i$  = mean income of the  $i$ th class of income of users

$N'(X_i)$  = cumulative number of relative frequency of income earners up to the  $i$ th class of income

$K$  = number of income class

The Gini coefficient varies from 0 to 1 where 0 implies perfect equality in the distribution of income, and 1 implies perfect inequality. The closer the Gini coefficient is to zero, the greater the degree of equality and the lower the level of inequality. Similarly, as the Gini coefficient approaches unity, the greater is the degree of inequality in household income distribution (Okereke & Anthonio 1988).

Objective IV: To determine the forms of value addition with associated income among Fadama and non Fadama users. This objective was achieved using descriptive statistics.

Objective V: to identify the areas of value addition on fadama activities in Imo State. This objective was achieved using descriptive statistics.

Objective VI: to determine the extent of value added in fadama activities in Imo State. This objective was achieved using the heckman two stage selection models; the reasoning behind the two stage approach is that the decision on the extent of value addition (the volume of value added) is usually preceded by a decision to engage in the process of value addition.

In the first stage, the decision to add or not to add value was assessed using a probit model, as specified in equation 3.9 below;

$$= P \quad \text{eqn (3.9)}$$

and in the second stage the Inverse Mills ratio (IMR) is added as a regressor in the extent of value addition equation to correct for potential selection bias as shown in equation 3.9

$$= \beta_i X_i | y\lambda | u_i \quad \text{eqn (3.10)}$$

Where  $y\lambda$  = the estimated Inverse Mills Ratio (IMR) and  $U_i$  = the error term

$Z_i^*$  =  $Z_i$  If and only if the farmer adds value

$B_i$  are the parameters to be estimated

The two equations were jointly estimated using the Heckman two stage procedure in STATA. The variables used in the two stage Heckman selection model are as shown below.

$Y$  = Value added (dummy variable, 1 for adding value, 0 for not adding value)

$X_1$  = Age of the household head ( years)

$X_2$  = Total land owned by the household (Ha)

$X_3$  = Access to credit (dummy variable, 1 for access, 0 for no access)

$X_4$  = Number of Household member (number)

$X_5$  = Level of household education (number. of years spent in school)

$X_6$  = Gender of household head (dummy variable, 1 for male, 0 for female)

$X_7$  = Farm size (Ha)

$X_8$  = Membership of Co-operative (dummy, 1 for membership, 0 for non membership).

**ObjectiveVII:** to analyse the determinants of household livelihood diversification strategies among fadama and non fadama users. This objective was achieved using logit model.

Drawing from Escobal's (2001) standard rural household model of the determinants of livelihood diversification which was based on push and pull factor, the logit model of analysis was used in this study to verify the relative contribution of factors that determine livelihood diversification strategy, The model is stated as follows;

$$\ln Y = \ln (P/1-P) \quad \text{eqn (3.11)}$$

$$\ln (P/1-P) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \dots + \beta_7 X_7 \quad \text{eqn (3.12)}$$

Where;

$Y$  = Livelihood diversification (dummy variable, 1 for diversified, 0 for not diversified),

$P$  = probability of household diversifying,

$1-P$  = probability of household not diversifying,

$\ln$  = natural logarithm function,

$\beta_0$  = constant

$\beta_1 - \beta_7$  = logistic regression coefficients.

The detailed description of the variables is as shown below.

$Y$  = livelihood diversification (dummy variable, 1 for diversified, 0 for not diversified),

$X_1$  = household size (number of persons)

$X_2$  = gender (dummy variable, 1 for male, 0 for female)

$X_3$  = Age (years)

$X_4$  = Education level (number of years spent in school)

$X_5$  = Cooperative membership (dummy variable, 1 for member, 0 for non member)

$X_6$  = access to credit/grant (dummy variable, 1 for access, 0 for no access)

$X_7$  = land ownership (dummy variable, 1 for land owner, 0 for tenant)

The logistic regression model expresses the qualitative dependent variable which in this study is dichotomous, as a function of several independent variables, both qualitative and quantitative (Gujarati, 1998, Fox, 1984). Since  $P$  is the probability of household diversifying,  $1-P$  is the probability of household not diversifying, the ratio  $P/(1-P)$ , known as the odds ratio, is the odds in favour of diversification. The natural logarithm of the odds ratio is called the logit model which is estimated through the method of maximum likelihood since data were collected on individual observations (Gujarati, 1998).

Objective VIII: to determine the effect of household socio-economic characteristics (household size, gender, age, educational level, extension visit, cooperative membership and farm size) on value addition of fadama and non fadama users.

This objective was achieved using the logit model; the model is as specified below;

$$LiY = \ln(P/1-P) \quad \text{eqn (3.13)}$$

Detailed description of the variables is as shown below.

$Y$  = value addition (dummy variable, 1 for adding value, 0 for not adding value)

$X_1$  = household size (number of persons)

$X_2$  = gender (dummy variable, 1 for male, 0 for female)

$X_3$  = Age of the household head (years)

$X_4$  = Educational level (number of years spent in school)

$X_5$  = Extension visit (number of visits)

$X_6$  = Cooperative membership (dummy variable, 1 for member, 0 for non member)

$X_7$  = farm size (hectare)

### **3.5. Empirical model for the estimation of value addition.**

To address the extent of value addition among Fadama users, the Heckman two stage selection model was used. It stipulates that the farmers' behaviour is driven by the need to derive and maximize the utility associated with the practice. Depending on the farmers' perception on the utility they are likely to derive from the practice, a choice is made, either to add value or not. This farmers'

behaviour that leads to a particular choice is modelled in a logical sequence, starting with the decision to add value, and then followed by a decision on the extent of the value addition. Since the farmers utility maximization behaviour cannot be observed, the choice made by the farmer is assumed to represent the farmers' utility maximization behaviour (Norris & Batie 1987; Pryanishnikov & Katarina 2003) cited in (Berem & Obare 2010). Based on the nature of these decisions, it is justified to use the Heckman two stage selection model whose estimation involves two stages. In the first stage, the decision to add or not to add value was assessed using a probit model. The choice of this model is based on the fact that the decision to add value is discreet; it is either one add value or not. Furthermore, the study assumes a normal distribution and hence the choice of the probit model. The reasoning behind the two stage approach is that the decision on the extent of value addition (the volume of value added) is usually preceded by a decision to engage in the process of value addition (Berem & Obare).. The probit model used in the first stage is as specified in Equation 3.17.

$$\text{Prob} (Y_i = 1 | X = \dots) = \Phi(X_s \beta) \quad \text{eqn (3.14)}$$

where  $Y_i$  is an indicator variable equal to unity for households that add value,  $\Phi(\cdot)$  is the standard normal distribution function,  $\beta$ 's are the parameters estimated and  $X_s$ 's are the determinants of the choice. When the utility that household  $j$  derives from value addition is greater than 0,  $Y_i$  takes a value equal to 1 and 0 otherwise. It follows therefore, that:

$$U_j = \beta_i X_i + V_i \quad \text{eqn (3.15)}$$

where  $V_i$  is the latent level of utility the household gets from value addition  $V_i \sim N(0,1)$ . Given this assumption, it follows that:

$$= 1 \text{ if } V_i > 0 \text{ and } = 0 \text{ if } V_i \leq 0 \quad \text{eqn (3.16)}$$

Empirically, the model can be represented as follows:

$$= \beta_j X_i + \varepsilon_i \quad \text{eqn (3.17)}$$

where  $Y$  is the probability of a household value adding given farm and farmers characteristics  $X_i$  and  $\varepsilon_i$  is the error term.

In the second step the Inverse Mills ratio (IMR) is added as a regressor in the extent of value addition equation to correct for potential selection bias. It will be expected that the extent of value addition is self selected in the sense that only some farmers choose to add value, hence the decision of the extent of value addition is preceded by the decision to add value. Consequently this raises an empirical problem of self selection. To reconcile this problem the decision to add value was treated endogenously in this study to control for the potential sample selection problem. Therefore, first the determinants of the decision to add value are estimated, then the mills ratio from the selected equation is used as an independent variable in the target equation that is used to assess the determinants of the extend of value addition.

$$E(Z_i|Y=1) = f(x_i + y\lambda) + u_i \quad \text{eqn (3.18)}$$

where  $E$  is the expectation operator,  $Z_i$  is the (continuous) extent of value measured by the proportion of value added output,  $x$  is a vector of independent variables influencing the extent of value addition and  $\lambda$  is a vector of the

corresponding coefficients to be estimated,  $\lambda$  is the estimated IMR and  $U_i \sim N(0, \sigma^2_u)$ . So  $Z_i$  can be expressed as follows:

$$= \beta_i X_i + y\lambda + u_i \quad \text{eqn (3.19)}$$

is only observed if the farmer is doing value addition ( $Y=1$ ), hence  $= 0$ .

Empirically, this can be represented as:

$$= \beta_i X_i | y\lambda | u_i \quad \text{eqn (3.20)}$$

where  $Z_i$  is the extent of value addition given the farm and farmer characteristics,  $(X_i)$ .  $\lambda$  is the inverse Mills Ratio estimated in step 1 of the Heckman model and  $u_i$  is the error term.

Equation (3.17) and (3.20) were then jointly estimated using the Heckman two stage procedure in STATA.

### **3.6 Hypotheses testing,**

- (i) There is no significant difference between Household income of Fadama and non-Fadama users in Imo state.

This hypothesis was tested using Z – statistic, which is mathematically stated as follows;

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad \text{eqn (3.21)}$$

Where  $Z$  = value by which the statistical significance of the mean difference between the two samples was judged.

$\bar{X}_1$  = mean of Fadama users household income,

$\bar{X}_2$  = mean of non-Fadama users household income,

$n_1$  = sample size of Fadama user,

$n_2$  = sample size of non-Fadama users,

$S_1^2$  = standard deviation of Fadama users,

$S_2^2$  = standard deviation of non-Fadama users,

The Z test was carried out in order to compare the values of the estimated Z-statistic. If the estimated Z statistic is greater than the tabulated Z statistic at 5 percent level of significance using a two tail test, the null hypothesis will be rejected but if the estimated Z statistic is less than the tabulated, the null hypothesis will be accepted.

(ii) Socio-economic factors (household size, gender, age, educational level, extension visit, cooperative membership and farm size) of Fadama and non Fadama Users have no significant influence on their household incomes.

This hypothesis was tested using the result of the regression analysis at 5 percent level of significance (0.05) with (n-k) degrees of freedom using a two tailed test.

$H_0: b_1 = b_2 = \dots = b_7 = 0$

Where

$n$  = number of observations

$k$  = number of parameters estimated plus intercept ( $b_0$ )

The null hypothesis was tested by comparing the estimated  $t^*$  statistic with the tabulated value at  $P < 0.05$  critical level.

Decision: The null hypothesis tested was accepted if the  $t^*$  calculated is less than  $t$  tabulated and rejected if  $t^*$  calculated is greater than  $t$ - tabulated at  $n-k$  degree of freedom for the relevant estimates for the co-efficients of  $b_1$  to  $b_7$ .

$t^* = \frac{b_i}{S(b_i)}$  —— Accept null if  $t^*_{\text{cal}} \leq t^*_{\text{tab}}$  at  $P < 0.05$  otherwise reject the null

where  $t^* = \frac{b_i}{S(b_i)}$  estimated  $t$  statistic

$b_i = \text{parameter estimates of } b_i$

$S(b_i) = \text{Standard error of } b_i$

### Testing of overall significance

The overall significant influence of the independent variable on the dependent variable was done using F test statistic and is given below.

$$F^* = \frac{R^2/(K-1)}{(1-R^2)/(n-K)} \quad \text{eqn (3.22)}$$

$F^* = \text{estimated f statistic}$

$R^2 = \text{Coefficient of multiple determination}$

$K = \text{Number of parameters estimated plus intercept (}b_0\text{)}$

$N = \text{Number of observations.}$

The  $F^*$  calculated was compared with the tabulated F value at 5 percent (0.05) level of significance. The null hypothesis will be accepted, if the estimated F statistic is less than the tabulated value of F at 5 percent level of significance, using  $(k-1)$  and  $(n-k)$  degrees of freedom.

If on the other hand, the estimated  $F^*$  statistic is greater than the tabulated value of  $F$  statistic using  $(k-1)$  and  $(n-K)$  degrees of freedom at 5 percent level of significance, then the null hypothesis will be rejected and alternative hypothesis accepted. That is if  $F^*_{\text{cal}} > F_{\text{tab}}$ . Null hypothesis will be rejected.

(iii) There is no significant difference in the livelihood diversification strategies of Fadama and non Fadama users' in the study area.

This hypothesis was tested using  $Z$  – statistic, which is mathematically stated as follows;

$$Z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad \text{eqn (3.23)}$$

Where  $Z$  = value by which the statistical significance of the mean difference between the two samples was judged.

$\overline{X}_1$  = mean of Fadama users livelihood diversification strategies,

$\overline{X}_2$  = mean of non-Fadama users livelihood diversification strategies,

$n_1$  = sample size of Fadama user,

$n_2$  = sample size of non-Fadama users,

$S_1^2$  = standard deviation of Fadama users,

$S_2^2$  = standard deviation of non-Fadama users,

(iv) Socioeconomic characteristics (household size, gender, age, educational level, extension visit, cooperative membership and farm size) of Fadama and Non Fadama users have no significant influence on their value addition.

This hypothesis was tested using the result of the regression analysis at 5 percent level of significance (0.05) with (n-k) degrees of freedom using a two tailed test.

$$H_0: b_1 = b_2 = \dots = b_7 = 0$$

Where

n = number of observations

k = number of parameters estimated plus intercept ( $b_0$ )

Decision: The null hypothesis tested was accepted if the  $t^*$  calculated is less than  $t$  tabulated and rejected if  $t^*$  calculated is greater than  $t$ - tabulated at n-k degree of freedom for the relevant estimates for the co-efficients of  $b_1$  to  $b_7$ .

$t^* =$ — Accept null if  $t_{cal}^* \leq t_{tab}^*$  at  $P < 0.05$  otherwise reject the null

where  $t^* =$  estimated t statistic

$b_i =$  parameter estimates of  $b_i$

$S(b_i) =$  Standard error of  $b_i$

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

#### **4.1 Socio – Economic Characteristics of Fadama and Non Fadama Users**

The socio – economic characteristics of the Fadama and non - Fadama users are presented below.

##### **4.1.1 Educational attainment of respondents**

Table 4.1 shows the distribution of the respondents according to educational attainment.

**Table 4.1 Distribution of Respondents According to Educational attainment**

Education level	FADAMA		NON FADAMA		AGGREGATE	
	frequency	percentage	frequency	percentage	frequency	Percentage
None	0	0	5	3.4	5	3.4
1 – 6	37	24.7	39	26	80	25.4
7 – 12	67	44.7	65	43.3	127	44
13 - 16	46	30.6	41	27.3	88	28
Total	150	100	150	100	300	100
Mean	9.6		8.9		9.3	

Source: survey data 2015

The table shows that 44.7% of the sampled Fadama users and 42.7% of non Fadama users attended secondary education. The table also showed that 30.75% of the Fadama users had tertiary education while 27.3% of the non Fadama users had tertiary education. The data also indicates that 24.7% of the Fadama users attended primary school while 26% of the non Fadama users attended primary school. Only 3.4% of the non Fadama users had formal education. The mean

year of education was 9.6 and 8.9 years for fadama and non Fadama users respectively. This implies that majority of Fadama and non Fadama users are literate. The data also indicated that Fadama users are more educated than the non Fadama users and thus may account for their participation in the Fadama project. The result of this study showed that the mean years of schooling of Fadama and non Fadama users is above UNDP, (2011) mean education index of 5 years for Nigeria. This finding is in line with the works of Bature et al (2013); Amanze et al (2015) and Mazza et al (2015), but at variance with the work of Oladimeji (2015) who reported 1.09 years mean years of schooling in Kwara State. Investment in education can increase its portfolio for income generation and enable them to find regular salaried jobs and having better understanding to self-employment by starting business and other income generating activities (Steimann. 2004 and Chaudhary 2009). Education is an indicator of quality of human resources and development stage of a society. It is an investment in human capital which is able to raise the qualities of skill of man, narrow his information gaps and increase his allocative ability thereby leading to more productive performance (Orebiiyi, 2000). It is likely that basic literacy is important for carrying out activities that range from production to services and manufacturing (Sanchez 2005). A change in the educational structure of a population necessarily induces changes in many dimensions of economic and social behaviour, each of which might have powerful secondary effect on income, its distribution, livelihood diversification strategies and poverty status of an average farmer. Education is considered a key to expand the horizons of the

minds and to develop thinking to live good social and economic life (UN, 2005;UNICEF, 2010).

#### 4.1.2 Household Size

Data presented in Table 4.2 depict the household sizes of Fadama and non Fadama users in the study area.

**Table 4.2: Distribution of Respondents by Household size**

FADAMA		NON FADAMA		AGGREGATE		
Household size	frequency	percentage	frequency	percentage	frequency	percentage
1 – 5	54	36	69	46	123	41
6 – 10	84	56	71	47.3	155	51.7
11 – 15	12	8	10	6.7	22	7.3
Total	150	100	150	100	300	100
Mean	7 persons		6 persons		6 persons	

Source: Survey data, 2015

The data show that the mean household size for Fadama and non Fadama users are 7 and 6 persons respectively. It also disclosed that majority (56%) and (47.3%) of the sampled Fadama and non Fadama users respectively had 6 – 10 persons, followed by 36% and 46% of same group who had 1 – 5 persons. Only 8% of Fadama and 6.7% of non Fadama users had 11 – 15 persons. This may suggest that both Fadama and non Fadama users in the study area have large household sizes. Large household size reduces the cost of hired labour, ensures availability of labour as well as expansion of farm size and supports diversification of livelihood activities. This finding is in line with the result of

Mazza et al (2015) Onubuogu et al., (2013); Esiobu et al., (2014) who reported that large household size is a proxy to labour availability and reduction in the cost of hired labour.

A household in this study refers to all the people living in the same home and sharing the same meal which include father, mother, children and any other person such as in-law, and house help, (Tiziana, Ernestina and Sara, 2010).

#### **4.1.3: Extension visits**

The data presented in Table 4.3 depicts extension contact by respondents.

Table 4.3: Distribution of Respondents by Extension Contact

Number of visits	FADAMA		NON FADAMA		AGGREGATE	
	frequency	percentage	frequency	percentage	frequency	percentage
None	28	19	100	66.7	128	42.7
1 – 25	75	50	40	26.7	115	38.3
26 – 50	32	21	5	3.3	37	12.3
51 – 75	15	10	2	1.3	17	5.7
≥ 76	0	0	3	2	3	1
Total	150	100	150	100	300	100
Mean	21		7		14	

Source: Survey Data, 2015

Table 4.3 indicates that (50%) of the Fadama users and (26.7%) of the Non Fadama users received 1-25 extension visits per year while 21% of Fadama users and 3.3% of non Fadama users received 26 – 50 visit per year. The table also showed that 10% of Fadama users and 1.3% of non Fadama users received 51 – 75 extension visits per year. Only 2% of the non Fadama users received 75 and

above extension visit per year. The result indicates that 28% of the Fadama users and 66.7% of the non Fadama users had no extension contact in the last one year. The mean number of visits per year was 21times for Fadama users and 7 times for non Fadama users. The implication of this finding is that Non Fadama users in the study area are poorly visited by extension agents compared with Fadama users. The number of visit witnessed among Fadama users in the study area could be attributed to facilitators attached to them.This finding is in line with the work of Mazza et al (2015). The result also indicates that among non Fadama users, extension contacts which is a channel through which agricultural innovations and information are passed to farmers for improvement in their standard of living, production and productivity, are missing (Chukwu, 2013a and Chukwu, 2013). According to Mohammed et al. (2005), farmers' main sources of information vary according to enterprise type. For their production decisions, for example, livestock Fadama and non Fadama respondents depend largely on information provided by veterinarians while crop farmers rely mainly on the advice of extension agents.

#### **4.1.4: Years of farming Experience**

The data presented in Table 4.4 depicts years of farming experience and their frequency distribution

**Table 4.4: Distribution of Respondents According to Farming Experience**

		FADAMA		NON FADAMA		AGGREGATE	
(Years)	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
<b>Farming experience</b>							
1 - 5	27	18	29	19.3	56	18.7	
6 – 10	34	22.7	28	18.7	62	20.7	
11- 15	30	20	19	12.7	49	16.3	
16 – 20	15	10	25	16.6	40	13.3	
21& above	44	29.3	49	32.7	93	31	
Total	150	100	150	100	300	100	
Mean	13.5years		14.23years		13.87years		

Source: Survey Data, 2015

Table 4.4 indicates that 29.3% of Fadama users and 32.7% of non Fadama users have farming experience of 21 years and above. This is followed by 22.7% of Fadama users and 19.3 % of non Fadama users who have 6- 10 and 1-5 years of farming experience respectively. The result showed that 20% of Fadama users and 18.7% of non Fadama users have 11 – 15 and 6- 10 years of farming experience respectively. The analysis also indicated that 18% of the Fadama users have 1–5 years of farming experience, and 16.6% of the non Fadama users have between 16 – 20 years of farming experience, while 10% of Fadama users and 12.7% of non Fadama users have between 16 – 20 and 11- 15 years of farming experience respectively. The average farming experience for Fadama users was 13.5 and 14.23 for non Fadama users. This result implies that there are

more experienced farmers among non Fadama users than Fadama users. This finding is in line with the work of Izuogu et al (2015) and disagrees with the work of Ogbonna et al (2014) in a similar study in Gombe.

#### **4.1.5 Gender**

The frequency distribution of respondents according to gender is presented in Table 4.5

Table 4.5 Distribution of respondents according to gender

Gender	FADAMA		NON FADAMA		AGGREGATE	
	frequency	percentage	frequency	percentage	frequency	percentage
Male	105	70	117	78	222	74
Female	45	30	33	22	78	26
Total	150	100	150	100	300	100

Source: Survey Data, 2015

The analysis of the result showed that 70% of the Fadama users are men while 30% are women. The table also showed that 78% of men are non Fadama users while 22% are women. This implies that there is more number of women in Fadama than in non Fadama activities. This could be attributed to the fact that Fadama project have special preference for women. This finding is in line with Mazza et al (2015) and Olaolu et al (2013) and disagrees with the work of (Achoja 2014) whose study showed that women participated more in Fadama project than men in Delta state.

Gender is defined as the social differences and relations between men and women. These social differences vary widely among societies and cultures and

changes overtime (International Labour Organisation, 2000). D'Hease and Kirsten (2006) defined gender as the socially constructed power relations between men and women characterised by a set of arrangements of culturally variable attributes and roles that men and women play in their daily lives. Gender refers to the qualitative and interdependent character of women and men's positions in society (Wombeogo, 2007). Gender relationships are important in shaping livelihoods diversification processes (D'Hease and Kirsten, 2006). Social organisation and culture can significantly influence the relative access to diverse household capital assets by constraining or promoting the ability to mobilise resources along gender lines (Ellis, 2000; Gladwin, 2001; Dolan, 2002).

#### **4.1.6: Age**

The age distribution of Fadama and non Fadama users in the study area is presented in Table 4.6.

**Table 4.6 Distribution of respondents according to age**

Age	FADAMA		NON FADAMA		AGGREGATE	
	frequency	percentage	frequency	percentage	frequency	percentage
≤ 30	1	0.7	0	0	2	0.6
31 – 40	6	4	33	22	55	18.5
41 – 50	46	30.6	43	28.6	102	34
51 – 60	75	50	45	30	90	30
61 – 70	21	14	25	16.7	46	15.3
≥ 71	1	0.7	4	2.7	5	1.6
Total	150	100	150	100	300	100
Mean	53years		50.4years		51.7years	

Source: Survey data, 2015

The households were classified into six age groups; i.e.  $\leq 30$  years, 31-40, 41-50, 51-60, 61-70 and 71 years and above. Table 4.6 show that (50%) and( 30%) respectively of Fadama and non Fadama users are within 51 – 60 years of age, while 30% of non Fadama users are within the same age bracket. The table also showed that 30.7% and 28.6% of Fadama and non Fadama users respectively are within the age bracket of 41 – 50 years. The data showed that 14% and 16.7% of Fadama and non Fadama users are within 61 – 70 years of age. From the table, 22% of non Fadama users are within 31 – 40 years while only 4% of Fadama users are within this group. The mean age of the Fadama and non Fadama users was found to be 53.5years and 52.1years respectively. This may suggest that the non Fadama users have younger farmers than the Fadama users in the study area. This finding is in line with the work of Ike (2012), but at variance with the national mean age of 48.5, the work of Henry-Ukoha (2011); Ibekwe (2012); Onubuogu et al., (2013) whose studies showed that majority of farmers are within the age bracket of 41 to 50years .

#### **4.1.7 Farm size**

The distribution of respondents according to farm size among Fadama and non Fadama users is presented in Table 4.7.

The table indicates that (64.7%) of Fadama users and (46%) of non Fadama users cultivated between 0.1 – 0.9 hectares of farm land. This is followed by 21.3% and 40% of Fadama and non Fadama users who cultivated 1- 1.9 hacters of farm land.

**Table 4.7 Distribution of Respondents According to Farm Size**

Size	FADAMA		NON FADAMA		AGGREGATE	
	frequency	percentage	frequency	percentage	frequency	percentage
None	9	6	2	1.3	11	3.7
0.1 - 0.9	97	64.7	69	46	166	44.7
1 - 1.9	32	21.3	60	40	92	37.3
2 – 2.9	9	6	19	12.7	28	12.7
3 – 3.9	3	2	0	0	5	1.6
TOTAL	150	100	150	100	300	100
MEAN	0.85hectares		1.12hectares		0.985hectares	

Source: Survey data, 2015

The study also showed that 6% and 12.7% of Fadama users and non Fadama users cultivated between 2 – 2.9 hectares of farm land. And this is followed by 3% of Fadama users who cultivated 3haectares of farm land. The mean farm size was found to be 0.85ha and 1.12ha for Fadama and non Fadama users respectively. The mean farm size for Fadama users is similar with the work of Adeyemo et al. (2010) that indicates an average farm size of 0.77 in Ogun State, Nigeria. This finding is also in line with the work of Mazza et al (2015) and Achoja (2014), but disagrees with the work of Awerije (2014) whose report showed an average farm size 0f 1.68ha in a study in Delta State. Unfortunately, a major problem to the transformation of agriculture in Nigeria is the scattered nature of farm holdings in the country (Nwaru, 2005). The size of farm operated by the household measured in hectares can tell us about the economic status of the household head (Mecharla, 2002). Land is the most important asset for the

farmers since a farming family's income/livelihood depends mainly on land Awerije (2014).

#### **4.2 Income Generating Activities (Farm and Non-Farm) among Fadama and Non Fadama Users.**

Rural areas usually provide two categories of income sources to their dwellers; Farm and the non-farm economy. Farming is the source of livelihood for the majority of people leaving in rural areas. According to (FAO 2013), out of 3 billion people living in rural areas in the world, 2.5 billion people derive their livelihood from agriculture. However, the contribution of the rural non-farm economy to rural livelihoods is also not trivial in rural areas. For instance, Haggblade et al. (2010) observed that non-farm income accounts for between 35% and 50% of total income of rural households in developing countries. Oxford policy management (Opm, 2004), noted that majority of households across all income strata in Nigeria are involved in several off-farm activities, whose importance has increased over the last 25 years. The data depicting income generating activities (farm and non-farm) among Fadama and non Fadama users and their income shares in the study area is presented in Table 4.8 and 4.9 respectively.

##### **4.2.1 Farm and Non-Farm Activities**

The distribution of fadama by farm and non-fadarm activities with income share is presented in Table 4.8.

Table 4.8: Farm and Non-farm activities engaged by Fadama users with their income share

Farm Activities	Aggregate income	No of participants	Income share	% income share
Crop	198257.7	142(95)*	0.354	35.4
Livestock	103049.2	71(47)*	0.184	18.4
Forestry	20161.8	9(6)*	0.036	3.6
Fishery	34723.1	20(13)*	0.062	6.2
Self-employment	98008.75	70(47)*	0.175	17.5
Non farm Wage employment	102489.15	31(21)*	0.183	18.3
Farm wage employment	3360.3	5(3)*	0.006	0.6

Source: Survey data, 2015. Figures in parentheses are percentages

\* multiple responses.

The table showed that 95% of the Fadama users engaged in crop activities and contributes 35.4% of the aggregate household income of Fadama users in the study area. Livestock is another important farm income generating activity among the Fadama users. Hence analysis of the result suggests that 47% of Fadama users participated in livestock activities and generated 18.4% of the household income.. The result also showed that 6% of Fadama users participated in forestry activities and generated 3.6% aggregate household income. Finally, 13% of Fadama users are involved in fishery activities and contributed 6.2% of aggregate household income. the table also showed that 47% of Fadama users participated in self employment with 17.5% income share, non farm wage employment among Fadama users' accounted for 18.3% of aggregate Fadama

users household income with 21% of the households participating. Farm wage employment as a non farm income generating activity accounted for 0.6% of aggregate Fadama users' household income.

#### **4.2.2 Farm and Non-farm Activities**

Table 4.9 depicts farm and non farm activities engaged by non-Fadama users with income shares.

**Table 4.9: Farm and Non-Farm Activities Engaged by Non Fadama Users with their Income Shares.**

Farm Activities	Aggregate income	No of participants	Income share	% income share
Crop	193029.31	146(97)*	0.413	41.3
Livestock	31782.07	28(18.7)*	0.068	6.8
Forestry	13554.12	12(8)*	0.029	2.9
Fishery	4206.45	5(3)*	0.009	0.9
Self-employment	107498.17	70(38)*	0.230	23
Non farmWage employment	84596.38	31(16)*	0.181	18.1
Farm wage employment	32716.83	5(14)*	0.070	7.0

Source: survey data 2015.

Figures in parentheses are percentages

\* Multiple responses.

The analysis in Table 4.9 showed that 97% of non Fadama users engaged in crop activities and generates 41.3% of aggregate household income. The result also showed that 18.7% engaged in livestock activities and contributed 6.8% of aggregate household income. Forestry and fishery accounted for 2.9% and 0.9% income share with 8% and 3% participation respectively. The further showed

that 38% of non Fadama users that engaged in self employment activities generated 23% of the aggregate household income. The data also showed that non farm wage employment among non Fadama users' accounted for 18.1% of the aggregate non Fadama usrs household income with 16% of households participating.

Comparatively the results of analysis in Tables 4.8 and 4.9 seem to suggest that Fadama users participated more in wage employment activities than non Fadama users. This goes to show that those who benefited from Fadama project are not only poor resource farmers but also salary earners. Non farm activities accounted for 36.4% of the total Fadama users' income and 48.1% of the total non Fadama users' income. This finding is similar to the work of Amanze et al. (2015) whose study showed that about 35% of rural incomes in Nnewi South stem from non-agricultural activities and disagrees with the work of Awoniyi and Salman (2011) who had a higher Non-farm income than farm income in a similar study conducted in South West Zone of Nigeria. The result of the analysis also showed that both Fadama and non Fadama users do not attach so much importance to fishery and forestry activities. This is evidenced from the number of participants in each of the activities. The finding showed that the major income generating activitites for both Fadama and non Fadama users are crop and livestock activities. However, despite the degree of diversification among Fadama and non Fadama users, farm activities remain the main source of income generation. The difference in percentage of income generated from farm activites among Fadama and non Fadama users could be attributed to the grant for asset acquisstion,

capacity building, advisory services and input support given to Fadama users by the Fadama project. The findings of this study are in line with the work of Tijani et al (2014) whose report showed that Fadama users and non Fadama users participated and generated more income from crop activities than any other activity in a similar study in Kogi and Kwara States.

#### **4.3: Household Income and Income Distribution among Fadama and non Fadama users.**

##### **4.3.1 Household Income**

Analysis of household income show that the mean household income for Fadama users was ₦560,050 per annum, while that of non Fadama users was found to be ₦467,383.33 per annum. This finding is in line with the work of Simonyan et al (2012) and Tijani et al (2014) whose studies showed that Fadama users generated more income than non Fadama users in Kaduna, Kogi and Kwara States respectively. The performance of Fadama users in income generation could be attributed to the Fadama project support in the areas of asset acquisition via grant, capacity building, advisory services, and linkage to credit agencies, market and input support etc. Meanwhile the Fadama baseline survey showed household income of ₦189, 245.90 (Asiabaka, 2011), which increased to ₦583, 516.25 at midline (Ibekwe, 2012). When this study is compared with the baseline and midline surveys, it clearly shows an increase in fadama and non Fadama users' mean household income by 66.2% and 59.5% at baseline and a decrease by 4.2% and 24.8% at medline respectively. The latter indicates that there is no workable sustainability plans in place, hence the decline in income generation among Fadama users as soon as the project was flagged down. In order

to sustainably increase the income of both users and non users of the Fadama project which directly affects the livelihood and livelihood diversification strategy of the sampled households, the Fadama subjects should be mainstreamed into the government annual work plan and budget. This would enable the Agricultural development programme (ADP) to assign her extension staff to take over the monitoring and supervision of the subprojects so as to identify areas of needs among the users. The decline in income of Fadama users observed in this study is in line with work of Bature et al (2013) who had a similar result at federal capital territory Abuja while the Fadama income increase in this study agrees with work of Girei et al (2013) and Agbarevo et al (2013) in their similar study in Adamawa and Benue States.

#### **4.3.2 Determinants of income among Fadama and non Fadama Users**

The determinants of income among Fadama and non Fadama users in Imo State were estimated using the ordinary least square (OLS) multiple regression technique. Four functional forms of the regression model; linear, semi-log, double log, and exponential were fitted to the data. The result of linear function which was selected as the lead equation in both Fadama and non Fadama is presented in Table 4.10 and 4.11. The table showed that the value of the coefficient of multiple determinations ( $R^2$ ) was 0.81 and 0.69. This implies that 81% of the variation in income of Fadama users and 69% of variation in income of non Fadama users were accounted for by the joint action of the independent variables included in the regression model.

**Table 4.10: Result of multiple regression analysis on Determinants of income among Fadama users**

Variables	Linear	Semi-log	Double-log	Exponential
Household Size ( $x_1$ )	-.171 (-2.614)**	-.158 (-2.148)*	-.182 (-2.641)**	-.103 (-1.903)
Gender ( $x_2$ )	.150 (2.135)*	.177 (2.153)*	.158 (2.302)*	.065 (1.329)
Age ( $x_3$ )	.016 (3.525)**	.187 (2.403)*	.132 (1.791)	-.013 (-.229)
Educational Level( $x_4$ )	.026 (6.213)**	.077 (1.162)	.070 (1.119)	.054 (1.078)
Farm Size ( $x_5$ )	.463 (9.752)**	.320 (4.387)**	.411 (5.935)**	.504 (8.870)**
Farming Experience( $x_6$ )	.044 (1.964)*	.063 (.879)	.098 (1.474)	.080 (1.468)
Land Ownership( $x_7$ )	.014 (0.450)	.044 (0.655)	.045 (0.715)	.011 (0.233)
Constant term	(2.041)*	(-1.799)	(11.271)**	(63.702)**
R <sup>2</sup>	0.812	0.483	0.539	0.718
F-ratio	87.88	18.96	23.69	51.76
n	150	150	150	150

**Source: Survey data 2015.** \*significant @ 5% level. \*\*significant @ 1% level.  
Figures in parentheses are the t- values

**Household size ( $X_1$ ):** The coefficient of household size was statistically significant at 1% level and negatively related to Fadama users' income. The negative relationship between household size and Fadama users' income implies that the fewer in household size the lesser the income.

**Gender ( $X_2$ ):** the coefficient of Gender of household head was found to be positively related to income and statistically significant at 5% level. Gender affects the choice of income-generating activities among Fadama users. In fadama project, both men and women have equal right to demand for assets but given the entry barriers (payment of counterpart fund, provision of land agreement etc), and differential ownership of and access to assets, men seem to dominate in both the Fadama community association and Fadama user groups and thus may have upperhand in asset acquisition. This finding is similar to those of Enwerem (2015) and Ibekwe (2012) but at variance with Ohajianya (2011) and (Asiabaka 2011) in their similar studies in Imo State.

**Age ( $X_3$ ):** There is no age barriers in accessing Fadama project instead, a group of youths and aged are tagged vulnerable group hence are limited from assessing asset of a particular threshold, except such group could afford to meet up with the eligibility crieteria for acquiring such assets. The analysis showed that the age of household head was found to be positively related to income and significant at 1% level. This could be linked to the fact that majority of Fadama users (85.3%) are at their working and viable age of 30 – 60 years. This finding is at variance with the work of Ibekwe (2012) and Asiabaka (2011) who noted that age has inverse relationship with household income.

**Education level ( $X_4$ ):** It was expected that higher level of education will contribute significantly to the decision making of a farmer. Higher qualification may also imply relatively greater set of employment opportunities create

awareness about projects and adoption of new agricultural technologies. The coefficient of education level was found to be positively related to Fadama income and significant at 1% level. This implies that higher education increases income of Fadama users. This finding is in line with the work of Ibekwe (2012) and Asiabaka (2011) whose mid line and baseline Fadama study in Imo state respectively showed that income of household increased with increase in number of years in school.

**Farm size ( $X_5$ ):** Farm size was found to be statistically significant at 1% level and positively related to Fadama users' income. This means that increase in farm size increases income of Fadama users. The size of farm operated by the households measured in hectares tells about the economic status of the household members. Large farms can be operated under modern and mechanized farming system giving rise to bigger economies of scale. This finding is in line with the work of Ibekwe (2012) and Asiabaka (2011) who observed that in Imo State the average income of Fadama household increased with the increase in size of farm of the household.

**Farming Experience ( $X_6$ ):** The coefficient of Farming experience was significant at 5% level and has a positive relationship with Fadama users' income. This could be linked to the fact that Fadama users with higher experience would understand the risk and uncertainty in farming and know how best to overcome them.

**Land Ownership (X<sub>7</sub>):** The coefficient of land ownership was found to be positive and not significant with Fadama users' income. This implies that land ownership has no impact on Fadama users' income. This could be linked to the fact that most Fadama income generating activities do not require vast portion of land.

**Table 4.11: Result of multiple regression analysis on Determinants of Income among Non Fadama Users**

Variables	Linear	Semi-log	Double-log	Exponential
Household Size (x <sub>1</sub> )	.215 (2.379)*	.148 (2.128)*	-.118 (-1.809)	-.012 (-.236)
Gender (x <sub>2</sub> )	.079 (1.987)*	.160 (2.286)*	215 (3.249)**	.142 (2.872)**
Age (x <sub>3</sub> )	-.097 (-2.201)*	.065 (-.809)	-.078 (-1.019)	-.078 (-1.417)
Educational Level(x <sub>4</sub> )	.088 (1.983)*	.153 (2.385)*	.159 (2.634)**	.070 (1.398)
Farm Size (x <sub>5</sub> )	.513 (12.485)**	.509 (6.889)**	.500 (7.182)**	.485 (9.267)**
Farming Experience(x <sub>6</sub> )	.044 (1.673)	-.040 (-.497)	.025 (-.032)	.059 (1.036)
Land Ownership(x <sub>7</sub> )	.014 (1.782)	-.026 (-.372)	-.004 (-.060)	.012 (.257)
Constant terms	(1.539)	(-1.950)	(15.132)**	( 81.391)**
R <sup>2</sup>	0 .69	0.547	0 .600	0 .769
F-ratio	34.142	24.48	30.39	67.48
n	150	150	150	150

Source: Survey data 2015. \*significant @ 5% level, \*\*significant @ 1% level  
Figures in parentheses are the t- values

**Household size (X<sub>1</sub>):** This is significant at 5% level and has a positive influence on the income of non Fadama users in the study area. This implies that

increase in household size increases income of non Fadama users. This could be that increase in household size makes for availability of labour that would be used in non Fadama activities to compliment labour to enhance production and reduce the cost of hired labour (Oluwatayo *et al.*, 2008). This result is consistent with the findings of Tasie *et al.* (2012) and Olawuyi *et al* (2012) but contradicts those of Chukwuemeka *et al.* (2011) and Fausat (2012) who reported negative and significant correlation between family size and household annual incomes.

**Gender ( $X_2$ ):** The gender of household head was found to be positive and significant at 5%. This implies that male headed households earn higher income than female headed households. This could be attributed to the choice of income-generating activities due to culturally defined roles, social mobility limitations and differential ownership of working capital and access to assets. It could also be linked to the fact that the men are stronger and capable of working longer hours and exploring various avenues of earning income, Asiabaka (2011). Gender affects diversification options, the choice of income-generating activities due to culturally defined roles, social mobility limitations and differential ownership of working capital and access to assets.

**Age ( $X_3$ ):** The analysis showed that the age of household head is found to be negative and significant at 5%. This implies that there is negative relationship between age and Non Fadama users' income, which means that as the age of the household head increases the income decreases.

**Education level (X<sub>4</sub>):** The result showed that level of education was positive and statistically significant at 5% level. The positive relationship between coefficient of education and non Fadama users' income could be attributed to the fact that education links rural households to new income sources, such as local wage work, and shifts households out of staple crop production and towards cash crop and wage work, which generates more income. This finding agrees with the work of Korie et al (2012).

**Farm size (X<sub>5</sub>):** Farm size was found to be statistically significant at 1% level and positively related to non Fadama users' income in the study area. This implies that increase in farm size increases incomne of non fadama users. The size of farm operated by the households measured in hectares tells about the economic status of the household. This finding is in line with the work of Korie et al (2012) in a study carried out in Imo State.

**Farming Experience (X<sub>6</sub>):** The coefficient of Farming experience was positive but not significantly related with non Fadama users' income. This implies that farming experience has no influence on non Fadama users' income.

**Land Ownership (X<sub>7</sub>):** land ownership was not significant but positively related to non Fadama users' income. This implies that land ownership has no influence on non Fadama users' income.

### **4.3.3: Analysis of Income Distribution of Fadama and Non Fadama Users.**

The vagaries of income distribution have been a subject of immense concern to economists for a long time, Mbanasor et al (2012). This is because high level of income inequality produces an unfavourable environment for economic growth and development (British Council, 2012).

In analysing the income distribution of Fadama and Non Fadama users, Gini coefficient was computed and the results presented in Table 4.12, 4.13 and 4.14.

**Table 4.12: Income Distribution by Fadama and Non Fadama Users**

<b>Income per annum (₦)</b>	<b>Fadama users</b>		<b>Non Fadama Users</b>	
	<b>Frequency</b>	<b>percentage</b>	<b>Frequency</b>	<b>Percentage</b>
100100 - 200000	4	2.67	11	7.33
200100 - 300000	9	6	19	12.67
300100 - 400000	28	18.67	29	19.33
400100 - 500000	32	21.33	31	20.67
500100 - 600000	21	14.00	26	17.33
600100 - 700000	17	11.33	17	11.33
700100 - 800000	16	10.67	9	6
800100 - 900000	8	5.33	3	2
900100 - 1000000	6	4.00	4	2.67
1000100 - 1100000	5	3.33	0	0
≥1200000	4	2.67	1	0.67
Total	150	100	150	100
Mean income/annum		560,050		467,383.33

**Source: Field data 2015**

Table 4.12 depicts the income distribution of Fadama and non Fadama users. It could be observed that majority of Fadama and Non Fadama Users representing 21.33% and 20.67% respectively of the total sample earned annual income that fell within ₦400100 – 500000 brackets. This was followed closely by 18.67% and 19.33% of Fadama and Non Fadama Users that received between ₦300100 and 400,000 annually, while 14% and 17.33% of Fadama and non Fadama users respectively are concentrated within the ₦500100 – 600000 income classes. With a mean income of ₦560,050 and ₦467,383.33 of Fadama and Non Fadama Users, it implies that 62.67% and 60% of Fadama and Non Fadama users respectively earn less than average income. The ratio of the mean income of the poorest Fadama and non Fadama users and the richest Fadama and non Fadama users were found to be 1:7 and 1:6 respectively. Disparity in income distribution is most evidenced among the Fadama users in the study area. This could very much be linked to disparity to access in asset acquisition as a result of entry barriers faced by most Fadama users. Besides, variations in the level of income obtained as witnessed by Fadama and non Fadama users in the study area could also be attributed to the dwindling economic situation and growing dimension of poverty faced by farmers.

Meanwhile, applying the formulae of (3.7) and (3.8) to the table, the value of the Gini (G) coefficient estimated as presented in Table 4.13 and Table 4.14 is 0.249 and 0.233 for Fadama and non Fadama users respectively. The result showed that income is fairly distributed among non Fadama users compared to Fadama users. The result of the Gini coefficient estimated here is in agreement with the

work of obasi et al, (2002), but differs from the findings of Mbanasor et al (2012), Ibekwe (2007), Babatunde (2012) and FAO (2006) who obtained a Gini coefficients of 0.987, 0.488, 0.40 and 0.51 for Abia State, orlu agricultural zone of Imo State, kwarra state and entire Nigeria respectively.

Table 4.13; Analysis of the Gini (G) coefficient of income distribution among Fadama users in Imo State, 2015

Income Class	frequency (f)	% freq. (% f)	Cum % freq. $N^I(X_i)$	1- $N^I(X_i)$	Total Income of ith class ( $X_i$ )	Mean I $\bar{X}_i$	$i+1 -$ $i$	$N^I(X_i)[1-N^I(X_i)]($ $i+1 -$ $i)$
100100 - 200000	4	0.0267	0.0267	0.9733	177000	44250.00	208305.60	5413.26
200100 - 300000	9	0.0600	0.0867	0.9133	2273000	252555.56	100765.90	7978.96
300100 - 400000	28	0.1867	0.2734	0.7266	9893000	353321.43	98756.70	19618.26
400100 - 500000	32	0.2133	0.4867	0.5133	14466500	452078.13	94255.21	23547.13
500100 - 600000	21	0.1400	0.6267	0.3733	11473000	546333.33	104019.60	24335.09
600100 - 700000	17	0.1133	0.7400	0.2600	11056000	650352.94	104959.60	20194.23
700100 - 800000	16	0.1067	0.8467	0.1533	12085000	755312.50	89562.50	11625.13
800100 - 900000	8	0.0533	0.9000	0.1000	6759000	844875.00	101958.30	9176.25
900100 - 1000000	6	0.0400	0.9400	0.0600	5681000	946833.33	95566.67	5389.96
1000100 - 1100000	5	0.0333	0.9733	0.0267	5212000	1042400.00	460100.00	11956.67
$\geq 1200000$	4	0.0267	1.0000	0	6010000	1502500.00		

k

$$= 2 \sum_{i=1}^k \{N'(X_i) [1 - N'(X_i)](X_{i+1} - \bar{X})\} = 2(39234.9204) = 278469.8408$$

$$G = \frac{2\bar{y}}{2\bar{y}} = \frac{278469.8408}{1120100} = 0.2486$$

Variables remain as defined for equation (3.7) and (3.8)

Table 4.14; Analysis of the Gini (G) coefficient of income distribution among non Fadama users in Imo State, 2015

Income Class	frequency (f)	% freq. (% f)	Cum % freq. $N^I(X_i)$	1- $N^I(X_i)$	Total Income of ith class ( $X_i$ )	Mean I $\bar{y}_i$	$i+1 - i$	$N^I(X_i)[1-N^I(X_i)](X_{i+1} - X_i)$
100100 - 200000	11	0.0733	0.0733	0.9267	1725000	156818.18	107339.70	7291.28
200100 - 300000	19	0.1267	0.200	0.8000	5019000	264157.89	91980.04	14716.81
300100 - 400000	29	0.1933	0.3933	0.6067	10328000	356137.93	105539.5	25183.32
400100 - 500000	31	0.2067	0.600	0.4000	14312000	461677.42	86245.66	20698.96
500100 - 600000	26	0.1733	0.7733	0.2267	14246000	547923.08	97900.45	17162.65
600100 - 700000	17	0.1133	0.8866	0.1134	10979000	645823.53	125954.2	12663.50
700100 - 800000	9	0.0600	0.9466	0.0534	6946000	771777.78	82555.56	4173.05
800100 - 900000	3	0.0200	0.9666	0.0334	2563000	854333.33	111416.7	3597.02
900100 - 1000000	4	0.0267	0.9933	0.0067	3863000	965750.00	(965750)	(6427.17)
1000100 - 1100000	0	0	0.9933	0.0067	0	0	1470000	9783.01
$\geq 1200000$	1	0.0067	1.0000	0	1470000	1470000		

$$k = \sum_{i=1}^k \{N'(X_i) [1 - N'(X_i)](X_{i+1} - X_i)\} = 2(108842.4161) = 217684.8322$$

$$G = \frac{2\bar{y}}{2\bar{y}} = \frac{217684.8322}{934766.66} = 0.2328$$

Variables remain as defined for equation (3.7) and (3.8)

#### **4.4 Forms of Value Addition and Associated Income among Fadama and Non Fadama Users.**

Value addition refers to the act of adding value(s) to a product to create form, place, and time utility which increase the customer value offered by a product or service (Fleming, 2005). It has been found to improve income and shelf-life of product on crops (lawal and jaiyeola, 2007) cite in (lawal, *et.al* 2011). This study considered value addition to be any improvement made to agricultural produce to bring it to a form in which the consumer wants it. Increased agricultural productivity alone is not a sufficient route out of poverty within a context of globalization and increasing natural resource degradation. A focus on post-harvest activities, differential value added products and increasing livelihood with access to market for goods produced by low-income producers would appear to be the strategy open to smallholders (Lundy et al, 2002). According to Punjabi (2007), it has become clear worldwide that the most rapid growth in agriculture has been occurring on the part of post-production activities. This is being driven by growth of middle income consumers even in low income countries and their demands for better quality value added products. Table 4.15 and 4.16 depicts forms of value addition and associated income among Fadama and non Fadama users in the study area.

**Table 4.15: Forms of Value Addition and Associated Income among Fadama Users in the Study Area.**

Before Value Addition		After Value Addtion	
Forms	Associated Income (₦)	Forms	Associated Income (₦)
Cassava Tuber	30/kg	Garri	166.67/kg
Palm fruit (FFB)	14/kg	Palm oil	250/litres
Fresh fish (Cat fish)	800/kg	Smoked Fish	1500/kg

Source: survey data 2015

**Table 4.16: Forms of Value Addition and Associated Income among Non Fadama Users in the Study Area.**

Before Value Addition		After Value Addtion	
Forms	Associated Income (₦)	Forms	Associated Income (₦)
Cassava Tuber	30/kg	Garri	166.67/kg
Cassava Tuber	30/kg	FuFu ( <i>loi loi</i> )	83.33/kg
Palm fruit (FFB)	14/kg	Palm oil	250/litres
Fresh fish (Cat fish)	800/kg	Smoked Fish	1500/kg

**Source: survey data 2015**

Table 4.15 and 4.16 show the forms and associated income before and after value addition among Fadama and non Fadama users in the study area. The findings showed that some value added products among Fadama users include;

garri, Palm oil and smoked fish. The result showed that there is no difference in cost of farm produce (cassava tuber, palm fruit, and fresh fish) between fadama and non Fadama users. This could be attributed to the fact that Fadama and non Fadama users access and use the same market. The analysis showed that 100kg of cassava tuber valued at ₦3000, when processed (value added) yields 24kg of garri (8 paints) valued at ₦4000 and in every unit of cassava tuber, ₦10 value is added. Palm fruit weighing 250kg, valued at ₦3500 when processed (value added) yields 20liters of palm oil valued at ₦5000, and in every unit of fresh fruit bunch of palm, ₦6 value is added. 1kg of fresh fish valued at ₦800, when smoked (value added) cost ₦1500/kg. However, the same form and associated income is obtained by non Fadama users in the study area, except *fufu*; a product of cassava tuber. This form of cassava value added product was more common among the non Fadama users than garri.

Cassava tuber weighing 100kg valued at ₦3000, when processed (value added) yields 54kg of *fufu* (9 sets of 11raps each) valued at ₦4500 and in every unit of cassava tuber ₦15 value is added to process it to *loi loi*. It is worthy to note that value addition has been a continued process among farm households in the rural area though in a small scale. As a means of increasing the income of users, Fadama project supported the beneficiaries to acquire a more moden processing equipment which enhanced the processing capacity and at the same time reduced drudgery among Fadama and non Fadama users in the study area. It suffices to say that the equipment procured through Fadama support was for both Fadama

and non Fadama users. The only difference is that the non Fadama users pay higher service charge for using the equipment than the Fadama users.

#### **4.5 Areas of Value Addition on Fadama Activities in Imo State.**

Increase in post harvest losses has continued to pose a great challenge to rural farmers in Imo state and Nigeria at large thereby limiting their income generation. Several researchers are of the view that Processing of cassava root tubers for instance into products that increase the shelf life of cassava would help to reduce the seasonal glut effects and bridge the food gap in developing countries. It would also serve as means of job creation and provide linkages between production and marketing processes (Awerije 2014; Eboh et al. 2012; Benin et al. 2010; and Awoyinka, 2009). Agricultural produce are known to be highly perishable, hence most rural farmers do not get the desired reward for their work as most of their produce are lost a day or two after harvest Aniedu et al (2012). In order to enhance the livelihood and sustainable income generation of the rural dwellers, the Nigerian government over the years introduced and implemented several policies and programmes aimed at increasing farmers' income, supporting livelihood activities and thereby reducing poverty. A recent effort towards this was the introduction of National Fadama Development Project. Fadama I focused mainly on crop production and largely neglected support of post production activities such as commodity processing, storage and marketing (downstream agricultural sector). The emphasis was on providing boreholes and pumps to crop farmers through simple credit arrangements aimed at boosting aggregate crop output (Nkonya *et al*, 2008). Fadama II and later

Fadama III project were implemented to address the problems identified in Fadama I by involving all the stakeholders in the common resource utilization and some downstream activities such as value addition and marketing were equally implemented. Fadama project in the study area supported the following activities; crop production (cassava, maize, garden egg, yam, rice etc.), livestock production (pig, poultry, sheep and goat) fishery production, forestry (apiculture, snairy, tree planting, grass cutter, etc), agro processing (cassava mill, oil mill, feed mill, palm kernel extracting mill,), farm implement, rentals, storage facility ( cold room), market infrastructure( lock-up shop , open market stalls), bore hole, construction of roads and coverts and irrigation facilities etc. However, the result of the findings showed that processing as a form of value addition is the only area supported by Fadama activity.

**Processing:** The concept “processing” entails the special treatment of the agric produce before it is consumed to make it last longer. For instance cassava roots are produced and processed as a subsistence crop for home consumption and sometimes for sale in village and urban markets. When cassava is processed, value has been added to the produce. Some of the value-added products in the study area are mainly garri, fufu, tapioca, palm oil, palm kernel oil etc.

#### **4.6. Determine the Extent of Value Added in Fadama Activities.**

To determine the extent of value addition in Fadama activities, the heckman two stage selection models was employed. The result of the heckman two stage selection models is presented in table 4.17. The result produced a chi-square

value of 39.11 which was significant at  $p = 0.05$  level, implying that the heckman model gave a good fit to the data.

**Table 4.17: Result of heckman two selection models on the determinant of the extent of value added in Fadama activities**

Variables	Coeff.	Std.Err.	Z	P> Z
Age ( $x_1$ )	.0987	0.0279	3.54**	0.000
Land ownership ( $x_2$ )	-0.1849	0.4165	-0.44	0.657
Access to Credit ( $x_3$ )	2.3892	0.7378	3.24**	0.001
Household Size ( $x_4$ )	0.0494	0.0607	0.81	0.415
Level of Education ( $x_5$ )	-0.0617	0.0385	-1.60	0.109
Gender ( $x_6$ )	-0.9546	0.3505	-2.72**	0.006
Farm Size ( $x_7$ )	0.9950	0.2552	3.90**	0.000
Membership of Co-operative ( $x_8$ )	-1.2862	0.5056	-2.54*	0.011
Constant	-6.4944	1.7317	-3.75**	0.000
$\rho$	-0.31332	Number of obs	=	150
$\Sigma$	.30661718	Censored obs	=	107
$\lambda$	-.09606931 .1926303	uncensored	=	43
waid $\chi^2$	39.11	pro> $\chi^2$	=	0.0065

**Source:** Survey data 2015 \*Significant @ 5% level, \*\*significant @ 1% level.

**Age ( $X_1$ ):** The age of the household head plays a major role in determining the extent of value addition in Fadama activities. The variable age was found to be significant at 1% level and positively related to extent of value addition. This finding is in line with work of Awerije (2014) whose result showed that age is significant at 5% level and positively related to quantity of garri processed in a similar study in Delta State but disagrees with the work of Kaine (2012) on *akpu*

(fufu) processing in Delta state. This implies that the older the household head, the likelihood to increase the volume of value added. This arises from the fact that as the decision maker grows older, he applies the experience he has gathered over the years.

**Land ownership ( $X_2$ ):** This variable was negative and not significant with extent of value addition. This implies that ownership of land has no influence on value addition. This can be explained by the fact that those who own large portion of land are normally involved in so many other on-farm activities like crop farming thus leaving no time for value addition.

**Access to Credit ( $X_3$ ):** The variable access to credit is significant at 1% level and positively related to extent of value addition. This implies that 1% increase in access to credit increases the extent of value addition by 23.8%.

**Household Size ( $X_4$ ):** The coefficient of household size was found to be positive and statistically non significant. This implies that Fadama users' household size has no influence on the extent of value addition. This could be attributed to the fact that most of the labour in farm and non farm are done by hired labour.

**Level of Education ( $X_5$ ):** This variable was negative and not significant. This implies that level of education has no influence on the extent of value addition. This could be probably because there is no skill required to increase the volume of value added in Fadama activities. Mishra and Uematsu, (2010) observed that educated people are more likely to earn more income hence they depend on other activities and put less effort and time on agribusiness activities like value addition.

**Gender ( $X_6$ ):** The gender of household head was found to be negative and significant at 1% level. This implies that female headed households are more involved in value addition than their male counterparts. This could be because value addition is more like a domestic work. Traditional or cultural practices and beliefs in Nigeria, as in many regions of the world, demand that the roles and activities of men and women are different. In most cases, the ordering of these roles is influenced by the ability of the head of the household to have access to farm inputs/resources (Olagunju et al 2013).

**Farm size ( $X_7$ ):** Farm size was found to be significant at 1% level and has a positive influence on the extent of value addition. This implies that an increase in farm size increases the extent of value addition.

**Membership of Cooperative Society ( $X_8$ ):** This was found to be statistically significant at 5% level and negatively related to extent of value addition.

#### **4.8 Determinants of Household Livelihood Diversification Strategies among Fadama and Non- Fadama Users.**

To analyse the determinants of household livelihood diversification strategies among Fadama and Non- Fadama Users, the logit regression model was employed. The result of the logit regression analysis is presented in Tables 4.18 and 4.19. The result produced a chi-square value of 53.9 and 31.99 for Fadama and non Fadama users respectively which were significant at  $p = 0.05$ level, implying that the logit model gave a good fit to the data.

**Table 4.18: Result of Logit Regression on Determinants of Household****Livelihood Diversification Strategies among Fadama Users.**

Variables	Coeff.	Std.Err.	Z	P> Z	Marginal effects
Household Size(X <sub>1</sub> )	-0.2052	0.0141	-3.32**	0.001	-0.0469
Gender (X <sub>2</sub> )	-0.1429	0.1062	-0.31	0.760	-0.0324
Age (X <sub>3</sub> )	-0.0751	0.0078	-2.20*	0.028	-0.0172
Education Level (X <sub>4</sub> )	0.2282	0.0138	3.77**	0.000	0.0522
Extension Visit (X <sub>5</sub> )	0.0175	0.0018	2.19*	0.029	0.0040
Social Organization(X <sub>6</sub> ) Membership	0.1698	0.0953	0.41	0.684	0.0387
Acess to Credit (X <sub>7</sub> ) Grant	-1.5737	0.0913	-3.06**	0.002	-0.2792
Constant	6.9687	2.3081	3.02**	0.003	
Log likelihood	-74.7584				
LR chi <sup>2</sup> (7)	53.90				
Pseudo R <sup>2</sup>	0.2650				
Number of obs	150				

**Source:** Survey data 2015 \*Significant @ 5% level, \*\*significant @ 1% level.

**Household size (X<sub>1</sub>):** Household size was found to be significant at 1% level and negatively related to household diversification strategy among Fadama users. This inverse relationship implies that an increase in Fadama household by one person reduces the odd to diversify by 4.6%. This finding is in line with the work of Abimbola et al (2014) in a similar study in Oyo State. This could be that most of the household members of the Fadama users are younger and of school going age and therefore did not participate in livelihood diversification strategies.

**Gender (X<sub>2</sub>):** The variable Gender was negative and statistically non significant. The result of the analysis suggests strongly that Gender does not affect livelihood diversification strategies among Fadama users. This could be linked to the fact that Fadama project is not gender biased.

**Age (X<sub>3</sub>):** This variable was found to be significant at 5% level and negatively influences Fadama users' decision to diversify. This implies that the odd to diversify decreases by 1.7% as the age increases by one year. The possible reason is that Fadama users, whose age is relatively younger, leaving other factors constant, could be pushed to engage more in non-farm activities than agriculture alone.

**Education level (X<sub>4</sub>):** This was found to be negative and statistically significant at 1% level. This implies that the odd to diversify decreases by 5.2% with increase in level of education. This could be attributed to the fact that with more formal education, preference for white collar jobs would be heightened.

**Extension contact (X<sub>5</sub>):** This variable was positive and statistically significant at 5% level. This implies that the likelihood to diversify increases by 0.4 % with extention visit.

**Membership of Cooperative Society (X<sub>6</sub>):** This variable was positive and statistically non significant, implying that social organization membership has no effect on livelihood diversification strategy among Fadama users.

**Access to Credit/ grant (X<sub>7</sub>):** This was found to be statistically significant at 1% level and negatively related to livelihood diversification strategies.This

implies that, access to credit decreases the likelihood to diversify by 27 %. This negative relationship may suggest that credit use allows farmers to follow agricultural intensification by accessing farm inputs.

**Table 4.19: Result of logit regression on Determinants of Household Livelihood Diversification Strategies among Non Fadama Users.**

Variables	Coeff.	Std.Err.	Z	P> z	Marginal effects
Household Size (X <sub>1</sub> )	0.263	0.004	2.06*	0.040	0.009
Gender(X <sub>2</sub> )	-1.245	0.024	-1.43	0.152	-0.034
Age (X <sub>3</sub> )	-0.085	0.001	-2.05*	0.040	-0.003
Educational Level(X <sub>4</sub> )	0.192	0.003	2.02*	0.043	0.006
Extension Visit (X <sub>5</sub> )	0.089	0.001	1.75	0.080	0.003
Membership (X <sub>6</sub> ) Cooperative Society	-2.281	0.045	-2.39*	0.017	-0.107
Acess to Credit (X <sub>7</sub> )	0.105	0.029	0.13	0.896	0.003
Constant	6.671	3.194	2.09*	0.037	
log likelihood =		-39.041593			
LR chi2(7) =		31.99			
Pseudo R2 =		0.2907			
Number of obs =		150			

**Source: Survey data 2015** \*Significant @ 5% level \*\*significant @ 1% level.

**Household size (X<sub>1</sub>):** Household size was found to be positive and statistically significant at 5% level. This implies that larger households diversify more than smaller households. The analysis showed that an increase in the number of

household members increase the odds to diversify by 0.9%. This finding agrees with the work of Olawuyi et al (2012) whose study showed that household size was significant at 1% level and positively related to livelihood diversification in a study in Ogun state.

**Gender ( $X_2$ ):** Gender was found to be negative and statistically non significant. This implies that gender has no influence on livelihood diversification among non Fadama users. This finding is in line with the work of Olawuyi et al (2012) in a similar study in Ogun state.

**AGE ( $X_3$ ):** This variable was found to be significant at 5% level and negatively related to livelihood diversification strategies. This implies that non Fadama users' choice to diversify decreases as they get older.

**Educational Level ( $X_4$ ):** Education attainment was found to be positive and statistically significant at 5% level. This direct relationship signifies that increase in education favours livelihood diversification. The analysis showed that acquiring higher level of education increases the odd to diversify by 6%. This result is consistent with the work of Idowu *et al.* (2011) who observed that education is a key determinant in the diversification of income generating activities in southwest Nigeria.

**Extension contact ( $X_5$ ):** Extension contact was found to be positive and statistically non significant. This implies that extention contact has no influence on livelihood diversification strategies among non Fadama users.

**Access to Credit ( $X_6$ ):** Access to credit was positive and statistically non significant. This implies that access to credit has no influence on livelihood diversification strategies among non Fadama users.

**Membership of Cooperative Society ( $X_7$ ):** This variable was found to be statistically significant at 5% level and negatively related to livelihood diversification strategy. This implies that, an increase in the number cooperative society decreases the odd to diversify by 10.7%. Though, cooperatives promote access to social capital in which non farm options are gained but the result of this study suggests that non Fadama users' participation in cooperative society would play important role in promoting agricultural development rather than diversification.

#### **4.9: Determine the Effects of Household Socioeconomic Characteristics on Value Addition of Fadama and Non- Fadama Users.**

To analyse the effects of household socioeconomic characteristics on value addition by Fadama and Non- Fadama Users, the logit regression model was employed. The result of the logit regression analysis is presented in Table 4.20 and 4.21. The result produced a chi-square value of 49.08 and 56.23 for Fadama and non Fadama user which were significant at  $p = 0.05$  level, implying that the logit model gave a good fit to the data.

**Table4.20: Result of logit regression on the effect of household****socioeconomics characteristics on value addition of Fadama users.**

Variables	Coeff.	Std.Err.	Z	P> Z	Marginal effects
Household Size(X <sub>1</sub> )	0.299	0.014	3.35**	0.001	0.046
Gender (X <sub>2</sub> )	-1.697	0.118	-2.66**	0.008	-0.315
Age (X <sub>3</sub> )	0.130	0.006	3.02**	0.003	0.020
Education Level(X <sub>4</sub> )	-0.077	0.009	-1.31	0.190	-0.012
Extension Visit(X <sub>5</sub> )	0.004	0.001	0.48	0.632	0.000
Cooperative Membership (X <sub>6</sub> )	-1.585	0.159	-2.08*	0.037	-0.332
Farm Size (X <sub>7</sub> )	1.267	0.066	2.96**	0.003	0.198
constant	-7.774	2.567	-3.03**	0.002	
log likelihood =	-64.403769				
LR chi <sup>2</sup> (7) =	49.08				
Pseudo R <sup>2</sup> =	0.0000				
Number of obs	150				

Source: Survey data 2015 \*Significant @ 5% level, \*\*significant @ 1% level.

**Household size (X<sub>1</sub>):** household size was found to be statistically significant at 1% level and positively related to value addition. The result of the analysis showed that, one extra person in the household increases the likelihood of adding value by 4.6%. The positive correlation between household size and value addition signifies that households with more members participate more in value addition than smaller household.

**Gender ( $X_2$ ):** Gender was found to be negative and statistically significant at 1% level. This negative relationship suggests that value addition is gender biased. The inverse relationship implies that women participate more in value addition than their men counterpart.

**Age ( $X_3$ ):** This variable was found to be statistically significant at 1% level and positively related to value addition. The result showed that the decision to add value increases by 2% as they age. This implies that households with older members participate more in value addition than household with younger members.

**Education Level ( $X_4$ ):** education was negative and statistically non significant with value addition. This implies that level of education has no influence on value addition.

**Extension contact ( $X_5$ ):** The variable Extention contact was found to be positive and statistically non significant. This implies that Extension contact has no influence on value addition. This could be attributed to the fact that extension agents dwell more on farming activities with little or no attention on issues of value addiotion.

**Membership of Cooperatives Society ( $X_6$ ):** This variable was found to be statistically significant at 5% level and negatively related to value addition. This implies that the choice to add value decreases with increase in cooperative membership.

**Farm size ( $X_7$ ):** Farm size was found to be statistically signifificant at 1% level and positively related to value addition. This direct relationship implies that

households with large farm size participate more in value addition than those with small farm size. The analysis showed that 1ha increase in farm size increases the decision to add value by 19.8%.

**Table 4.21: Result of logit regression on the effect of household socioeconomics characteristics on value addition of non Fadama users.**

Variables	Coeff.	Std.Err.	Z	P> Z	Marginal effects
Household Size ( $X_1$ )	-0.181	0.011	-2.84**	0.005	-0.033
Gender ( $X_2$ )	1.841	0.060	4.14**	0.000	0.252
Age ( $X_3$ )	-0.049	0.004	-2.08*	0.038	-0.009
Educational Level ( $X_4$ )	-0.107	0.009	-2.04*	0.041	-0.019
Extension Visit ( $X_5$ )	0.031	0.003	1.53	0.125	0.005
Social Organization Membership ( $X_6$ )	1.452	0.097	2.93**	0.003	0.286
Farm Size ( $X_7$ )	-4.933	0.154	-5.85**	0.000	-0.901
Constant	4.739	1.720	2.76**	0.006	
log likelihood =		-69.307663			
LR chi <sup>2</sup> (7) =		56.23			
Pseudo R <sup>2</sup> =		0.2886			
Number of obs =		150			

Source: Survey data 2015 \*Significant @ 5% level \*\*significant @ 1% level.

**Household size ( $X_1$ ):** household size was found to be statistically significant at 1% level and negativeiy related to value addition. The negative correlation between household size and value addition implies that household with large

members participate less in value addition. The result showed that an increase by one person in the household reduces the odd to participate in value addition by 3.3%. The negative effect of household size on value addition could be that most members of the households are younger and of school going age and therefore did not participate in value addition.

**Gender ( $X_2$ ):** Gender was found to be positive and statistically significant at 1% level. This positive relationship signifies that gender influences value addition.

**Age ( $X_3$ ):** This variable was found to be statistically significant at 5% level and negatively related to value addition. The result showed that the odd to participate in value addition decreases by 0.9% as household heads grow old. The negative relationship implies that households with older members would participate less in value addition.

**Education Level ( $X_4$ ):** The variable education was negative and statistically significant at 5% level. The result showed that one year increase in education reduces the odd to participate in value addition by 1.9%. This is probably because with more formal education, preference for white collar jobs would be heightened.

**Extension contact ( $X_5$ ):** This was found to be positive and statistically non significant. This implies that extension contact has no influence on value addition. This could be attributed to the fact that extension agents dwell more on farming activities with little or no attention on non farm activities among non Fadama users.

**Membership of Cooperative Society ( $X_6$ ):** This variable was found to be statistically significant at 1% level and positively related to value addition. The result showed that the choice to add value increases with increase in cooperative participation. Increases in cooperative participation increase the odd to participate in value addition by 28.6%.

**Farm size ( $X_7$ ):** Farm size was found to be statistically significant at 1% level and negatively related to value addition. The result showed that 1ha increase in farm size reduces the odd to add value by 90.1%. This could be attributed to the fact that those who have large portion of farm may consider selling their produce at farm gate in bulk rather than going through the process of adding value.

#### 4.10 Hypotheses testing.

- (i). There is no significant difference between Household income of Fadama and non-Fadama users in Imo state.

This hypothesis was tested using Z statistic (eqn3.21) and the result is shown in table 4.22.

Table4.22: Hypothesis of no significant difference between Fadama and non Fadama users' household income.

Group of Respondents	Sample Size (N)	Annual Mean(x) Income	Standard Deviation	Z value	Z critical value @0.05	Decision
Fadama income	150	560050	89035.57	8.53	1.96	Reject null
Non Fadama income	150	467383.33	98895.18			hypothesis

**Z ( $\alpha/2$ ) at 5%  $\pm 1.96$**

**Source: Survey data 2015**

The result of hypothesis tested as shown above showed a Z- value of 8.53. The value was compared with the tabulated value of Z at the 0.05 level which is  $\pm$  1.96. It was observed that the estimated critical ratio was greater than the tabulated, implying a significant difference between Fadama and non Fadama income. The finding suggested that Fadama users generated more income than the non Fadama users. Therefore the null hypothesis was rejected and the alternative hypothesis; that there was a significant difference between Fadama and non Fadama income was accepted. This finding agrees with the work of owoicho (2010) in a similar study in Kano State.

(ii). Socio-economic factors of Fadama Users have no significant influence on their household income.

The overall significance of the influence of the determinants on the dependent variable was tested using result of the Ordinary Least Squares (OLS) multiple regression analysis already performed to achieve objective (iii). The results are presented in Table 4.10. The regression analysis was tested at 5 percent level of significance (0.05) at  $(k-1)$  and  $(n-k)$  degrees of freedom using one tailed test, and the significant influence of the independent variable on the dependent variable was done using F test statistic (eqn 3.22), and the result showed that;

$$F(0.05) (7,142) = 1.96$$

$$F^*(0.05) (7,142) = 87.88$$

The estimated F value (87.88) was compared with the tabulated F value (1.96) at  $(k-1)$  and  $(n-k)$  degree of freedom using one tailed test. The result suggested that the null hypothesis be rejected; therefore the alternative hypothesis which stated

that the Socio-economic factors of Fadama Users have significant influence on their household income was accepted. Thus there is a significant relationship between the dependent variable (Y) and the independent variables (Xs) in the study area.

(iib). Socio-economic factors of non Fadama Users have no significant influence on their household income.

To test this hypothesis, the Ordinary Least Squares (OLS) multiple regression analysis already performed to achieve objective (iii) was re-employed. The results are presented in table 4.11. The regression analysis was tested at 5 percent level of significance (0.05) with (k-1) and (n-k) degrees of freedom using one tailed test, and the significant influence of the independent variable on the dependent variable was done using F test statistics (eqn 3.22), and the result showed that;

$$F(0.05) (7,142) = 1.96$$

$$F^*(0.05) (7,142) = 34.124$$

there is a significant relationship between the independent variable and the dependent variables. This suggested that the Socio-economic factors of non Fadama Users have significant influence on their household income. Therefore the null hypothesis which stated that Socio-economic factors of non Fadama Users have no significant influence on their household income was rejected.

(iii). There is no significant difference between Fadama and non Fadama livelihood diversification strategies in the study area.

This hypothesis was tested using Z statistic (eqn 3.23) and the result is shown table 4.23.

Table4.23: Hypothesis of no significant difference between livelihood diversification strategies Fadama and non Fadama users

Group of Respondents	Sample Size (N)	Mean(x) livelihood Strategies	Standard Deviation	Z value	Z critical value @0.05	Decision
Fadama livelihood Strategies	150	2.32	14.19	0.32	1.96	accept null hypothesis
Non-Fadama Livelihood strategies	150	1.95	13.06			

**Z ( $\alpha/2$ ) at 5%  $\pm$  1.96**

**Source: Survey data 2015**

Comparatively, the result showed that there is no significant difference between the livelihood diversification strategies of Fadama and non Fadama users. Therefore the null hypothesis which stated that there is no significant difference in the livelihood diversification strategies of fadama and non fadama users was accepted.

(iva). Household socio-economic characteristics of Fadama users have no significant influence on their value addition.

To test this hypothesis, the logistic analysis already performed to achieve objective (viii) was re-employed. The result are presented in Table 4.20. The table showed that the chi-squared calculated was significant at 5% level of probability and concluded that the factors indicated actually influenced fadama users on their value addition. Therefore the null hypothesis which stated that

socio-economic characteristics of Fadama users have no significant influence on their value addition was rejected.

(ivb). Household socio-economic characteristics of Non Fadama users have no significant influence on their value addition.

To test this hypothesis, the logistic analysis already performed to achieve objective (viii) was re-employed. The result are presented in Table 4.21. The table showed that the chis quared calculated was significant at 5% level of probability and concluded that the factors indicated actually influenced non fadama users on their value addition. Therefore the null hypothesis which stated that socio-economic charateristics of non Fadama users have no significant influence on their value addition was rejected.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Summary**

This study compared the livelihood diversification strategies of fadama and non Fadama users in Imo State, Nigereia. The specific objectives were to:

- (i) examine the socio-economic characteristics of Fadama and Non-Fadama users;
- (ii) identify the income generating activities (farm and non- farm) engaged by Fadama and non Fadama users in the study area;
- (iii) determine the household income and income share, its determinants and distribution among Fadama and non-Fadama users in the study area;
- (iv) determine the outputs and forms of value addition and associated income among Fadama and non Fadama users;
- (v) identify the areas of value addition on fadama activities in Imo state;
- (vi) determine the extent of value added in fadama activities in Imo state;
- (vii) analyse the determinants of household livelihood diversification strategies among fadama and non- fadama users;
- (viii) determine the effects of household socioeconomic characteristics on value addition of Fadama and non- Fadama users in the study area.

Data used for the study were collected with the aid of structured questionnaire administered to 150 randomly selected Fadama users (drawn from FCAs and FUGs) in the six chosen local government areas of the state that benefited from both Fadama I and Fadama II project. In other to make up for the non Fadama users, another set of 150 structured questionnaires were administered to

randomly selected Non Fadama users within the same communities where the Fadama users were drawn making it a total of 300 questionnaires. Data were analyzed using descriptive statistics namely; mean percentages and frequency distribution as well as net farm income model, Gini coefficient, and Ordinary Least Squares (OLS), multiple regression analysis, and logit model.

Results of the analysis showed that majority (44.7%) of the sampled Fadama users and (42.7%) of non Fadama users had secondary education, with 9.6 years and 8.9 years as mean years of education for Fadama and non Fadama users respectively. The majority (56%) and (47.3%) of the sampled Fadama and non Fadama users had 6 – 10 members with a mean household size of 7 and 6 persons respectively. A greater proportion (50%) of the Fadama users and (26.7%) of the Non Fadama users received between 1 to 25times extension visits per year with mean number of visits of 21times for Fadama users and 7times for non Fadama users per year. The result showed that a greater percentage (29.3%) of Fadama users and (32.7%) of non Fadama users had atleast 21years of farming experience with mean farming experience of 13.5years and 14.23years for Fadama and non Fadama users. In addition, good proportions (70%) of the Fadama users are men while (30%) are women while most (78%) of men are non Fadama users and (22%) are women. Majority (50%) of the Fadama users fell within 51 – 60 years of age, while 30% of non Fadama users fell within the same age bracket with a mean age of 53 and 50.4years for Fadama and non-Fadama users respectively.

The results of the analysis further show that farming activity is the major source of income generation among Fadama and non Fadama users in the study area, contributing 63.6% and 51.9% of Fadama and non Fadama users' total household income with 95%, 47%, 6% and 13% of Fadama users participating in crop, livestock, forestry, and fishery activities, and 97%, 18.7%, 8% and 3.3% of non Fadama users participating in crop, livestock, forestry and fishery activities respectively. Non farm activities contributed 36.4% of the Fadama users' total household income with 47%, 21% and 3% participating in self employment, waging paying and remittance, each contributing 17.5%, 18.3% and 0.6% respectively of non farm income in the study area. In the same vain, non farm activities among non Fadama users contributed 48.1% of their total household income with 38%, 16%, and 14% participants in self employment, non farm wage employment and farm wage employment and each having an income share of 23%, 18.1% and 7% of the non Fadama users non farm income. Meanwhile, the analysis showed that Fadama users mean household income was ₦560, 050 per annum while non-Fadama users mean household income was found to be ₦467, 383 per annum. Determinants of Fadama users household income include; household size, gender, age of the farm household head , educational level, farm size and farming experience, while determinants of non-Fadama users household income were household size, gender, age of the farm household head , educational level and farm size.

The income distribution showed that majority of Fadama and Non-Fadama Users representing 21.33% and 20.67% respectively of the total sample earned annual

income that fell within ₦400100 – 500000 brackets. This was followed closely by 18.67% and 19.33% of Fadama and Non-Fadama Users that received between ₦300100 and 400,000 annually, while 14% and 17.33% of Fadama and non Fadama users respectively are concentrated within the ₦500100 – 600000 income classes. With a mean income of ₦560,050 and ₦467,383.33 of Fadama and Non-Fadama Users, it implies that 62.67% and 60% of Fadama and Non-Fadama users respectively earn less than average income of ₦560,050 and ₦467,383.33 respectively. The ratio of the mean income of the poorest Fadama and non-Fadama users and the richest Fadama and non-Fadama users were found to be 1:7 and 1:6 respectively. The Gini coefficient of 0.249 and 0.233 were estimated for Fadama and non Fadama users in the atudy area. Disparity in income distribution is most evidenced among the Fadama users in the study area.

The findings also indicated that value added products among Fadama users are garri, Palm oil and smoked fish with associated income of ₦166.67/kg, ₦250/liter, and ₦1500/kg. The value added products for non Fadama users in the study area include garri, fufu (*loi loi*), palm oil, and smoked fish with associated income of ₦166.67/kg, ₦83.33/kg, and ₦250/liter and ₦1500/kg respectively. The study discovered that processing as a form of value addition was supported by Fadama project. However the factors that influenced value addition were age, access to credit, gender, farm size and cooperative membership.

Determinants of livelihood diversification strategy among Fadama users were household size, age, educational level, extension visit and access to credit. While

livelihood diversification strategy among Non Fadama users are influenced by household size, age, educational level and cooperative membership. It was also noted that household size, gender, age, cooperative membership and farm size are among the socio economic factors that affect value addition among Fadama users, while household size, gender, age, educational level, cooperative membership and farm size affected value addition among non Fadama users.

On tests of hypotheses, hypothesis 1 was rejected and the alternative hypothesis accepted since there was a significant difference between Fadama and non Fadama users' income in the study area. Hypothesis 2a was rejected with respect to the significant variables and accepted with respect to the non-significant variables. Hypothesis 2b was also rejected with respect to the significant variables and accepted with respect to the non-significant variables. Hypothesis 3 was accepted because there was a significant difference between the livelihood diversification strategies of Fadama and non Fadama users in the study area. Hypothesis 4a was rejected with respect to the significant variables and accepted with respect to the non-significant variables. Hypothesis 4b was rejected with respect to the significant variables and accepted with respect to the non-significant variables.

## **5.2: Conclusion**

Based on the finding of this research study it can be concluded that Fadama project did not contribute to any significant difference in livelihood diversification strategies but contributed to the significance difference in

household income of Fadama and non Fadama users. Fadama and non Fadama users are involved in multiple sources of livelihood activities simultaneously as a means for sustainable livelihood and income generation. Fadama is an important community development project that has contributed positively to household income, supported livelihood diversification, and promoted value addition in the study area.

### **5.3 Recommendations**

On the basis of the findings of this study, the following recommendations are made.

- i. Members of the community should actively participate in community development projects designed and sponsored by government and donor agencies that will enhance their income generation and livelihood.
- ii. Government and donor agencies during project design should eliminate factors that could creat barrier for some farmers or community members from accessing such projects.
- iii. Projects like Fadama should be captured in the state and local government annual work plan and budget. This would enable the ministry of agriculture and natural resources or agricultural development programme (ADP) to assign her extension staff to supervise and monitor the subprojects for sustainable income generation.
- iv. Government policies aimed at sustainable livelihood and income generation should focus equally on both the farm and the non-farm

sectors. Hence farming as a primary source of income may not guarantee sufficient livelihood for most Fadama and non Fadama users' households in Imo State.

- v. Government and donor agencies should intensify efforts to encoperate packaging and labeling of Fadama products. This would enable fadama produce to be acceptable at the global market.
- vi. There is need for policy makers and programme planners to take factors like household size, gender, age, cooperative membership and farm size into consideration in designing programmes aimed at improving the standard of living of the rural populace by coming up with policies that will eliminate gender bais, encourage households to form cooperative groups and enlightenment and sensitization programmes in order to build the capacity of the less literate in the society.

#### **5.4 Contribution to knowledge**

The research contributed to knowledge in the field of agricultural economics by providing a modified methodological approach for determining income distribution among Fadama and non Fadama users in Imo State.

It also contributed to knowledge by providing insight into livelihood diversification strategies adopted by Fadama and Non Fadama users in Imo State.

A very silent contribution of the study to knowledge is that agricultural intervention programs like Fadama affects livelihood diversification strategies, household income and income distribution among users. More so the evidence in the study confirmed that farming is the major source of income of Fadama and non Fadama users and households are engaged in multiple sources of income generation simultaneously.

It contributes to the intellectual understanding of the role of donor assisted projects in sustainable income generation and poverty alleviation. It also has a significant contribution to fostering the understanding of how Fadama project contributed to household income, income distribution, value addition and livelihood diversification strategies.

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## Appendices

### **Associated income on value addition among fadama and non fadama users**

#### **Cassava Tuber**

1 wheel barrow of cassava tuber = 100kg = ₦3000

100kg of cassava tuber (CT) ≡ 8 paints (3.0kg) of garri

100kg of cassava tuber = 24kg of garri.

1kg of CT = X

X = 24/100kg of garri

1kg of CT = 0.24kg of garri

100kg of CT = ₦3000.

1kg = X

X = 3000/100 = ₦30

1kg of CT = ₦30

But 1kg of CT ≡ 0.24kg of garri

1 paint of garri = 3kg = 500

But 1kg of garri = ₦500/3 = ₦166.67

Therefore 0.24kg of garri = ₦166.67 × 0.24 = ₦40

Value addition to a unit of cassava tuber = ₦40 - ₦30 = ₦10

#### **Palm fruit**

250kg of fresh fruit bunch (FFB) = ₦ 3500

1kg of FFB = ₦X

X = 3500/250 = ₦14

1kg of FFB = ₦14

250kg of FFB  $\equiv$  20liters of Red oil

1kg of FFB = X liters of red oil

$$X = 20/250 = 0.08$$

Therefore 1kg of FFB  $\equiv$  0.08 liters of oil

But 20 liters of oil = ₦5000

1liter of red oil = ₦X

$$X = 5000/20 = ₦250$$

1 liter of red oil = ₦ 250

0.08 liters of red oil =  $250 \times 0.08 = ₦20$

Therefore value added to a unit of FFB = ₦20 - ₦14 = ₦6.00

### Cassava tuber

1 wheel barrow of cassava tuber = 100kg = ₦3000

100kg of cassava tuber (CT)  $\equiv$  9sets (11 rabs each) of fufu.

100kg of cassava tuber = 54kg of fufu (*lio loi*)

1kg of CT = X

$$X = 54/100\text{kg of } lio\ loi$$

1kg of CT = 0.54kg of *lio loi*

100kg of CT = ₦3000.

1kg = X

$$X = 3000/100 = \text{₦}30$$

$$1\text{kg of CT} = \text{₦}30$$

$$\text{But } 1\text{kg of CT} \equiv 0.54\text{kg of } loi\ loi$$

$$1 \text{ set (11 rabs) of } loi\ loi = 6\text{kg} = 500$$

$$\text{But } 1\text{kg of } loi\ loi = \text{₦}500/6 = \text{₦}83.3$$

$$\text{Therefore } 0.54\text{kg of } loi\ loi = \text{₦}83.3 \times 0.54 = \text{₦}45$$

$$\text{Value added in a kg of CT to } loi\ loi = \text{₦}45 - \text{₦}30 = \text{₦}15$$

### Fresh fish

$$1\text{kg of fresh fish} = \text{₦}800$$

$$1\text{kg of fresh} \equiv 0.65 \text{ of smoked fish}$$

$$1\text{kg of smoked fish} = \text{₦}1500$$

$$0.65\text{kg of smoked fish} = \text{₦}975$$

$$\text{Therefore } \text{₦}800 \equiv \text{₦}975$$

$$\text{Value added in 1kg of fresh fish} = \text{₦}975 - \text{₦}800 = \text{₦}175.$$

# **QUESTIONNAIRE ON LIVELIHOOD DIVERSIFICATION STRATEGIES AMONG FADAMA AND NON-FADAMA USERS IN IMO STATE, NIGERIA**

## **SECTION A: SOCIAL-ECONOMIC CHARACTERISTICS**

1 Date of interview .....

2. Number of Questionnaire .....

3. Local Government Area.....

4. Name of Community.....

5. Type of household

(a) Non Fadama Beneficiary

(b) Fadama II Beneficiary

(c) Fadama III beneficiary

(d) Fadama II and Fadama III Beneficiary

6. Name of Fadama Community Association (FCA) .....

7. Name of Fadama User Group (FUG) .....

8. Type of your Fadama subproject.....

9. Gender of respondent,      Male       Female

10. Marital Status,      Married       Not Married

11. Age of respondents (years).....

12. Educational status (years).....

13. Household size (number).....

14. Extension visit in a year (number) .....

15. What is your Farm size (Ha).....

16. Farming experience (years).....

17. What is your major occupation? (a) Farming

(b) Civil service  (c) trading  (d) artisan

18. How many hours do you spend in farm work per day? .....
  19. How many times do you go to farm in a month? .....
  20. What is your secondary occupation? .....
  21. How many hours do you spend in off farm activity per day.....
  22. How many hours do you spend in off farm activity per month.....

## **SECTION B: INCOME GENERATING ACTIVITIES**

21. Please indicate in the table below your major and minor source of income generation; also indicate chosen from the ranges below the estimated average amount per year for each of the sources indicated.

S/N	Source of income generation	Major	Minor	Amount / year
<b>1</b>	FARM INCOME			
A	Crop			
B	Livestock			
C	Forestry			
D	Fishery			
<b>2</b>	OFF FARM INCOME			
A	Civil service			
B	Artisan			
C	Petty trading			
D	Remittance			
E	Pension			

- (c) Fisheries.....kg
- (d) Forestry.....kg
28. How much do you earn from the sale of crop output per year.....
29. How much do you earn from the sale of reared livestock per year....
30. Did you rent out /sold land in the last one year; Yes  No
31. If yes to 30 above how much did you earn from the rent/sale of the land.....
32. Did you participate on farm loan; Yes  No
33. If yes to 26 above how much interest in cash did you make.....
34. Do you use family labour; Yes  No
35. Giving the cost of labour in your locality, how much is the worth of the family labour used last year in your farm.....
36. What was the cost of hired labour in your farm last year.....
37. Do you have access to market information Yes  No
38. Is there market in your community? Yes  No
39. What is the distance of the market from your home.....
40. Do you sale your produce in the market Yes  No
41. How many times in a month do you send your produce for sale.....
42. How many times in a year do you send your produce for sale.....
43. How much does it take you to transport your produce for sale per year?.....
44. Do you use improved seeds in your farm Yes  No
45. If yes, indicate the quantity, and amount involved in the purchase
- (a) Cassava stem .....bundle, N.....per bundle
- (b) Maize .....kg N.....per kg
- (c) Okro.....kg N.....per kg

(d) Melon seed.....kg N.....per kg

Others, please specify .....

- .....
46. Do you use insecticides in your farm Yes  No
47. If yes to 46 above, how much did you spend in buying insecticides in last farming season.....
48. Do you use fertilizer in your farm? Yes  No
49. If yes what quantity did you use last farming season.....kg
50. How much do you buy a 50kg bag of fertilizer.....
51. In the last one year, how much have you spent in the purchase of farm tools.....
52. How much did you spend in the repairs of your farm tools last year.....
53. How much did you spend on hiring farm tools last year.....
54. How much did you spend on hiring of tractor(s) last year.....
55. How much have you spent on renting barns in the last farming season.....
56. Are you involved in giving loan to people Yes  No
57. If yes to 56 above how much did you receive as interest for such loan last year.....
58. How much did you make from the resale of purchased crop.....
59. How much did you make from the resale of purchased animals and animal products.....
60. How much did you make from the resale of purchased tools and fertilizer.....
61. How much did you make from the resale of purchased nonagricultural items.....

62. How much did you make from the sales of field and tree crops harvested in the last one year.....
63. What is the worth of kind payment on land rented out or sold.....
64. What was the worth of kind payment on tree rented out or sold.....
- .....
65. What was the worth of interest received in kind on farm loan last year.....
66. What was the worth of your unsold livestock last year.....

### **SECTION C: VALUE ADDITION**

67. Do you process your agricultural produce before sale? Yes  No
68. If yes to question 67, tick in the table below, the agricultural produce you process and indicate the form after processing

S/N	Agric produce	thick	Form(s)
1	Cassava tuber		
2	Yam		
3	Plantain		
4	Maize		
5	Coco yam		
6	Pineapple		
7	Poultry		
8	Piggery		
9	Sheep/goat		
10	Honey		
11	Fish		
12	Palm fruit		
13	Palm kernel		

69. What quantity do you process? .....kg/liter
70. How many times do you process in a month? .....
71. Where do you source agric produce for processing.....
72. What is the value of the agric produce you processed? ₦.....
73. How many kg/ liters do you get after processing? .....
74. Where do you sell your processed produce.....
75. What is the distance of the market (wheres you sell your processed produce) from your home? .....km
76. How much is the value of your processed produce ₦.....

#### **SECTION D: SOCIAL CAPITAL**

77. Do you belong to any social organization? Yes  No
78. If yes, how many do you belong to? .....
79. What benefits do you get from these groups? .....
- .....
- .....

#### **SECTION E: ACCESS TO FINANCIAL ASSETS**

80. Have you ever taken a loan? Yes  No
81. if yes, how many times? .....
82. where did you take it from? .....
83. if no, why? .....
84. have you ever been given Grant? Yes  No
85. if yes, how many times? .....
86. where did you get the Grant from? .....,
87. if no, why? .....
88. do you operate a savings bank account Yes  No
89. If yes to question above , what is the name of your bank.....
90. How much do you have in your bank account now.....
91. If your answer to question above is no, do you have constraints in operating a savings account Yes  No
92. If your answer to question 82 above is yes, please indicate the type of constraints you have in operating a savings account.....
- .....

## **SECTION F: ASSET POSSESSION**

93. Please fill the table below indicating the asset you have, the quantity and the value of the asset.

S/N	Asset	Life span	Quantity	Value
1	Matchetes			
2	Cutlasses			
3	Hoes			
4	Shovel			
5	Poultry house			
6	Knapsack sprayer			
7	Water pumps			
8	honey collection equipment			
9	Tractor			
10	Cassava mill			
11	Palm oil mill			
12	Wheel barrow			
13	Fish pond			
14	Fish smoking kiln			
15	Rentals			
16	Piggery pen			
17	Hunting traps			
18	Boat/outboard Engine			
19	Fishing nets/traps			
20	Palm kernel cracker			
21	Bicycle			
22	Motorcycle			
23	Keke Napew			
24	Pick-up truck			
25	Water troughs			
26	Feeding troughs			
27	Bore holes			
28	Generator			
29	Fryer			
30	Ceiling machine			
31	Other assets (specify).....			