COMPARATIVE ANALYSIS OF TOMATO PRODUCTION AMONG FARMERS USING INFORMAL AND FORMAL CREDIT SOURCES IN KANO STATE, NIGERIA

BY

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A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY IN PARTIAL FULFILMENT FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN AGRICULTURAL ECONOMICS DEPARTMENTOF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY, FACULTY OF AGRICULTURE, AHMADU BELLO UNIVERSITY, ZARIA NIGERIA

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DECLARATION

I declare that the work in the thesis entitled "Comparative Analysis of Tomato Production among Farmers Using Informal and Formal Credit Sources in Kano State, Nigeria" has been performed by me in the Department of Agricultural Economics and Rural Sociology under the supervision of Prof. J.F. Alamu and Dr. Zakari Abdulsalam. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this thesis was previously presented for another degree at any university.

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Prof. J.F. Alamu Date

Chairman, Supervisory Committee

CERTIFICATION

This thesis entitled "**COMPARATIVE ANALYSIS OF TOMATO PRODUCTION AMONG FARMERS USING INFORMAL AND FORMAL CREDIT SOURCES IN KANO, NIGERIA**" by Ahmed, Sabo Sa'id, meets the regulations governing the award of the degree of Master of Science of Ahmadu Bello University Zaria, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated to my late father, Alhaji Hassan Sa'id Ibrahim and my beloved mother, Hajiya Binta Ahmad Nahula.

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All praise is to Allah the Beneficent, the Merciful, His Blessing and Salutation be upon Prophet Muhammad (SAW), his household and his companions.

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ABSTRACT

This study analysed and compared tomato production among farmers using informal and formal credit sources in three Local Government Areas of Kano State, Nigeria. Three-stage sampling procedure and random samples were used to select 120 informal (66) and formal (54) credit beneficiaries out of 600 tomato farmers in twelve villages (i.e. four villages from each local government). Interview method of data collection was used to collect the data. The analytical tools used were descriptive statistics, farm budgeting and production function analysis.

The results showed that while the average age of farmers who got credit from the informal sources was 33 years, the average age of farmers who got credit from formal sources was 34 years. The result further revealed that, the farmers that got credit from informal sources applied for an average of N47,000.00 but they got an average N43,000.00 while those who got credit from the formal sources applied for an average of N99,000.00 but they got an average of N66,000.00. The resource use efficiency showed that the two groups of farmers did not use their input resources efficiently. The net farm income of farmers who used informal sources was N46, 000.00 while farmers who used formal sources had a net farm income of N114, 942.00. Thus, while the average rates of return of those who got loan from informal sector was 33kobo per every naira invested, that of those who got loan from formal sector was N1.00 per every naira invested.

In terms of constraints; for farmers who got credit from informal sources, high interest rate was ranked first; insufficient amount of credit was ranked second while lack of extension services in the areas was ranked third. For farmers who got credit from formal sources, late disbursement of credit was ranked first, insufficient amount of credit was ranked second and high interest rate was ranked third.

It can then be concluded that production of tomato among small scale farmers in the study areas is relatively profitable but the optimum profit has not yet been reached due to the high interest rate on credit, late disbursement and insufficient amount of credit received by tomato farmers among others which leads to underutilisation of resources and ultimately result to relatively low output.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

The importance of agriculture is manifested in the provision of employment opportunities to over 70% of the Nigerian workforce, provision of food and fibre needs of the population, supplying raw materials to the growing industrial sector, source of foreign exchange earnings and ready markets for the products of industrial sector (Rogers, 1999; Ebong, 1984 and Ekpo and Umoh, 2005). However, the dearth of capital and appropriate farming technology have been identified as the most critical factors around which all other production factors revolve and ultimately depend upon (Ajakaiye, 1997). It can therefore be contended that the agricultural production limitation that is facing Nigerian rural farmers boarders upon availability of appropriate technologies and requisite financing for acquisition and efficient utilisation of farm inputs. Inadequate financial capital has been one of the major constraints to increasing food production and modernising agriculture (Ijere, 1988). In Nigeria, farmers' adoption of new technologies requires the use of improved inputs, which must be purchased. However, most rural farmers are poor. The rural farmers' savings ability is very low and they are unable to purchase new technology because of insufficient credit (Ogungbile and Olukosi, 1991). This situation in the rural area implies that farmers

require assistance in form of credit in order to adopt new technologies to improve their farm productivity and income.

Agricultural credit therefore, means access to capital for purpose of farming for which payment will be made at later date (Alamu and Yakubu, 2002). While agricultural financing, according to Otu *et-al* (2003), can be classified as formal or informal. Formal financial institutions are subject to banking laws and other specific regulations governing their establishment. The informal financial institutions operate outside legal frameworks and are governed by social control mechanisms and norms. This sector is made up of money–lenders, friends, relatives, asusu or adashe groups, produce buyers, traders, merchants and local co-operatives (Aryeetey, 1995).

In an attempt to solve farmers' agricultural production financing problems, the federal government has come in, in different ways to assist rural farmers. In 1973 the Nigerian Agricultural Credit Bank (NACB) was established to lend to state credit institutions at 5-6% interest rate and the states in turn were to lend to farmers at slightly higher rate of interest. The name was later changed to Nigerian Agricultural and Co-operative Bank (NACB) in 1978 to embrace co-operative activities and emphasize the importance of credit in agricultural production. However, the NACB has undergone some changes in name and functions, its name

was change to Nigerian Agricultural, Co-operative and Rural Development Bank (NACRDB) limited and of recent it was renamed Bank of Agriculture (BOA).

Central Bank of Nigeria in 1972 prescribed the size of credit allocation by banks to designated sectors. According to Balogun (1986), between 1969 and 1982, the commercial banks were obliged to grant a minimum of eight percent (8%) of their total credit to agriculture at six percent (6%) interest and between 1971 and 1977, agricultural loans by commercial banks was at an average of three percent (3%) to the total commercial banks lending to economy which then grew to approximately to seven percent (7%) between 1978 and 1984. He further stated that, the mandatory sectoral allocation of loans and advances to agriculture was reviewed upward to twelve percent (12%) in 1985, fifteen percent (15%) in 1990 and eighteen percent (8%) in 1991. However penalty was attached in the form of amount in default being given interest free to the NACB by any bank who fails to comply with the guidelines. Before the deregulation of interest rate in July 1987, lending to agriculture by financial institutions was completely through NACB and Agricultural Credit Guarantee Scheme Fund (ACGSF) at concessional rate of interest. Other efforts which were made by the FGN to induce a positive participation of banks in developing the rural financial markets were the two initiatives of rural banking scheme and agricultural credit guarantee scheme fund

established in 1977/1978. The ACGSF guarantee 75% of the loan granted to farmers by commercial banks. The rural banking was equally initiated to remedy the anomaly of the skewed distribution of commercial banks between urban and rural areas. The CBN constrained commercial banks to establish a specified number of branches in the rural areas (Olukosi, 1988).

The informal source of credit constitute fund from relatives, friends, traders, merchant, money lenders, saving groups (adashe or asusu), and these are institutions which meet short term production or consumption needs. Miller (1977) stated that the informal source is the most extensive supplier of credit in Nigeria, yet the source has not supplied the amount of credit required nor has it provided credit on the terms required by farmers to modernize their farming method on a short term basis and the interest charge are sometime greater than 100% annually. This shows that the informal sources are very easy means but very expensive source of credit to rural sector.

1.2 Statement of problem

Nigeria's agricultural productivity is declining. Among the factors that contributed to the low agricultural production is the provision of credit which is considered to be necessary for the growth and development of agriculture in Nigeria. This is particularly true for small scale agriculture, and the small scale farmers in Nigeria

constitute over 70% of the populace and they generally require capital in form of credits to undertake farm production and other farming activities, expand output and increase their income. In spite of efforts put by governments and other financial institutions (formal and informal alike) to deliver credits to small scale farmers in the past, the deficit between credit supply and demand in the study areas continue to widen making it impossible for the tomato farmers in the study areas to meet their cost of inputs thereby resulting in the underutilization of these inputs and the income realised by the farmers continue to dwindle leaving a large number of the rural dwellers in abject poverty. Improving availability, access and quantum of credits from these sources in the study areas may stimulate increase in output and by implication the income of the tomato farmers.

A relevant issue for empirical investigation is that of comparing the effect of the two credit sources on tomato production using similar inputs. It is therefore the intention of this study to address the following research questions:

i. What are the socio-economic characteristics of farmers using informal and formal sources of credit in the study areas?

ii. What is the aggregate amount of agricultural credit requested by the two groups of farmers and aggregate amount obtained from the two credit sources in the study areas?

iii. What is the input and output relation of the two groups of tomato farmers?

iv. What is the efficiency of resource use in tomato production by the two groups of farmers in the study areas?

v. How profitable is tomato production under the two loan category?

vi. What are the constraints affecting the delivery of each type of agricultural credit in the study areas?

1.3 Objectives

The broad objective of this study is to analyse and compare the effects credit on tomato production among farmers using informal and formal credit sources in twelve villages of Kano Agricultural and Rural Development Authority (KNARDA) Zones i.e. Dambatta, Kura and Gaya local government areas of Kano State.

The specific objectives are to:-

i. describe the socio-economic characteristics of the tomato farmers who use informal and formal sources of credits;

ii. determine and compare the aggregate amount of agricultural credit requested by the two groups of farmers and aggregate amount of loan obtained from the credit sources in the study areas;

iii. determine and compare the input and output relations of the two groups of tomato farmers ;

iv. determine and compare the efficiency of resource use by the two groups of farmers;

v. determine and compare the profitability of tomato production for the two groups of farmers; and:

vi. identify the constraints affecting the delivery of the two types of agricultural credits.

1.4 Justification of the study

Quite a number of studies on the role of agricultural finance on production have been conducted in a number of states particularly on institutional credits (Kyiowom, 1998; Iniodu and Udoka, 1994; Nweze, 1994; Okorie and Miller, 1976; Tsafe, 1996 and Iniodu, 1991) but little or no work has been done to examine and compare the effect of informal and formal credits on tomato productivity in the study areas. Informal credits just like the formal credits are an important source of finance in the rural area. But while the formal institutions are regulated, well planned and organised, the informal institutions are unregulated, unorganised and uncoordinated but still remains the major sources of finance in intended areas of study.

Comparative analysis of tomato production among farmers using informal and formal of source of rural credits, which this research effort intends to address, will help in determining the efficiency or otherwise of the two financing segments as they relate to tomato production. Furthermore, the study may also provide empirical data on level of inputs, output, profitability and efficiency of resource use to see if there is room for increasing benefits through resource adjustments.

The findings of the study may also be important and useful to not only the policy makers and agricultural financing agencies but also farmers and general public alike. Finally, the result is hoped to advance the frontier of knowledge and provide basis for future research work, policy planning and developmental processes.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Role of Finance in Agricultural Production

Finance, according to Nnanna et al (2004); Onyenweaku (2002) and Iniodu and Ukpak (1996), can be defined as indispensable tool for management of all forms of organization and can be regarded as critical factor in an investment. Finance therefore, plays a catalytic role in inducing development of commodity producing sectors of the economy such as agriculture. Olukosi (1988) is of the view that capital is one of the most important constraining factors of production.

2.2 Economic Importance of Tomato

The economic potentials of tomato crop in the tropics are enormous. According to Grubbin (1977), various scientists have attempted to set priorities for vegetable crops in the tropical countries consistently ranked tomato first for increased production and for more intensive research. Tomato is a source of vitamins and calories when consumed in larger quantities, this can create a larger demand, thereby stimulating local production (Babara, 1976).

2.3 Factors of production

Olukosi and Erhabor (1988), recognised four principal factors of production; land, labour, capital and management. Olayide and Heady in 1982 defined factors of

production as follows: Land is a physical natural resource of paramount importance on which production take place; labour implies human effort in terms of man-hour or man-days and is the second most important input in farm production; capital includes farm machinery, tools, seeds, water, fertilizers, building, physical cash and credits; management coordinates the other factors of production.

2.3.1 *Input and Output Relations in a Production Process*

Inputs are usually mixed in a production process to produce output. Inputs can be combined in many different ways and levels to result to an output. Inputs can be combined in different ways and levels to give rise to output. According to Olayide and Heady (1982), inputs could be fixed or variable. A fixed input is necessary for production but its quantity remains constant irrespective of quantity of output produced. However, the quantity of variable input on the other hand change with the level of output produced. The technical relationship between inputs and outputs in any production process is usually expressed as a production function (Olayide and Heady, 1982). In mathematical terms, this function is assumed to be continuous and differentiable, which makes it easy to estimate the rates of return. Production function takes many forms and has become one of the most widely used tools in economic analysis. The choice of any form will depend on its

desirable characteristics. The purpose of production function is to identify and estimate how variable inputs employed explains variability in output.

2.3.2 *Production function analysis*

The technical relationship between inputs and outputs in any production scheme or process is usually expressed as a production function (Olayide and Heady, 1982). Mathematically, this function is assumed to be continuous and differentiable which makes it easy to estimate the rate of return. Production further takes many forms such as linear, semi log and double log which are most widely used tools in economic analysis. The choice of any form will depend on its desirable characteristics. The man purpose of the production function is to identify and estimate how variable inputs employed explain the variability in output.

2.3.3 *Resource use efficiency*

Resource basically refers to inputs used in the production process. In agricultural production economics, one of the fundamental goals is to provide the needed guiding principles to individual farmers on how efficiently their farm resources can be utilised. According to Kohler (1982), the concept of efficiency is concerned with relative performance of the process used in transforming inputs to outputs. However, Olayide and Heady (1982), classified it into technical and economic: Technical efficiency focuses on physical productivity, it relates to the degree to

which farms are producing on the production function as opposed to below or inside it. In other words, for the same amount of resources, some farmers obtain higher yield than others. Allocative or economic, on the other hand, relates to the degree to which farms operating on their production function employ correct amount of resources in such a way that their marginal revenue (MR) and marginal cost (MC) are equal. Explicitly, farmers choose resources in such a way as to maximise their profit. The principle to follow to find the most profitable level of a variable input is to increase its level of application to the point at which the value of its marginal physical products just equal to its cost. Marginal value products (MVP) of resources used are normally estimated using regression coefficients and the prices of the inputs. The MVP will then be compared with the cost of one unit of particular resource, the marginal factor cost (MFC).To make inference on efficiency of resource used (Olukosi and Ogungbile, 1989) used the following equation:

r=MVP/MFC

Where,

r=efficiency ratio

MVP=marginal value product

MFC=marginal factor cost

If,

r>1, means resources employed by the farmer are under utilised.

r=1, means resources employed by the farmer are efficiently utilised.

r<, means resources employed by the farmer are over utilised.

2.4 Profitability concept in agriculture

Profitability in some businesses exists because they are managed more efficiently than others. The reward for doing the job better is usually called profit. The prospect of earning and maintaining profitability serves as the incentive for creativity and efficiency among farmers. Profitability stimulates farmers to venture into risky business and also drive them to develop ways of cutting cost and adopting new technologies always in an effort to satisfy consumer interest (Troke, 1981). Profitable agriculture is dependent to a large extent on productive soil, plant variety, plant vigour insect control and climatic conditions. Apart from weather conditions, production methods such planting and cultivation determine the success of tomato production, early planting and cultivation provides good yield and high profit.

Profit maximisation is one of the important goals of farm business. Profit is generally described as the difference between total revenue (TR) and total cost (TC). The total revenue is the product of output sold and the unit price. While the

total is divided into fixed and variable costs. According to Olukosi and Erhabor (1982), fixed costs are those costs incurred on fixed inputs which cannot be used up during one production process, on the other hand, variable cost are those costs associated with variable inputs and do change with changes in output level.

2.4.1 *Gross margin analysis*

Gross margin is a very useful planning tool in a situation where fixed cost is negligible portion of farming enterprise as in the case of subsistence agriculture. It is easily computed and represents the most relevant economic tool to draw the attention of the farmer to the problem of his farm. Gross margin analysis, according to Olukosi and Erhabor (1988), involves evaluating the profitability and efficiency of an agricultural enterprise or farm. It is usually expressed as Gross income minus Total variable cost.

2.4.2 *Net farm income*

This is one of the simplest and oldest tools of analysis in farm management and production economics studies. It involves the determination of gross or total revenue and gross or total costs. The difference between the two constitutes the net farm income. The total revenue is derived from unit price of output multiplied by the quantity of output. While the total costs is made up of total variable cost and total fixed cost. The total variable costs are those costs that varied with level of

production such as cost of labour, pesticides, fertilizers etc., while fixed costs are those costs that do not vary with the level of output such as irrigation machines, bicycle and farm implements.

2.5 Role of Rural Finance in Agricultural Development

Finance, according to Nnanna *et al* (2004); Onyenweaku (2002) and Iniodu and Ukpak, (1996) is an indispensable tool for the management of all forms of organizations and can be regarded as a critical factor in investments. It plays a catalytic role in inducing development of commodity producing sectors of the economy. Finance is a process of channelling funds in the form of credit, loans or invested capital to those economic entities that need them most and can put them to most productive use. They further averred that finance is determined by the level of available savings which in turn is determined by income.

Olukosi (1988) is of the view that capital is one of the most important constraining factors of production. He defined capital from its three functional aspects; firstly as a productive asset, secondly as anything that increases the purchasing power and thirdly as anything that serves as a means of creating investment. Access to capital either owned or borrowed is an essential pre-requisite for sustained expansion in

production whether on the farm, industry or commerce. He reaffirmed that the significance of capital as a means of increasing agricultural production and productivity can be appreciated from the Norman's economic study of three villages in Zaria province in 1970. Norman found out that increased capital base resulted in increased area of operation as well as higher productivity of farm resources at farm level. In Nigeria, financial resources at the farm level are so limited that they can hardly support a moderate infusion of capital into the agricultural system to enhance the efficiency of other inputs. The fact still remains that agriculture is a major contributor to the Nigeria economy in terms of feeding the nation, employment generation, supply of industrial raw materials and foreign exchange earnings. Improvement in the management of Nigeria's rural financial market is, therefore, likely to influence the nation's agricultural production. (Iniodu and Ukpak, 1996; Ukeje, (2002).

What then is rural finance? Iniodu and Ukpak (1996), defined rural finance to encompass the financial side of most economic processes in rural areas including everything that involves savings, financing and risk insurance. Schmidt and Kropp (1987), also define rural financial system to include "all savings and financing opportunities as well as the valid norms and modes of behaviours related to the

financial system''. The major concern of rural finance for economic management policy according to them includes:

- Problem and opportunity associated with financing, investment and utilization of financial means as opposed to the mere provision of financial means through credit.
- Small-scale enterprises including small farms, small enterprises and households.
- Formal and informal financial institutions.

2.6 Significance of Agricultural Credit as a Source of Capital for Agricultural Development

Credit, an important input in agricultural development, was defined by Tsafe (1996) as the process of obtaining control over the use of money, goods and services in the present in exchange for a promise to repay at future date. He stated that credit is the transfer of purchasing power to the entrepreneur say a farmer without which development cannot take place. Olukosi (1988), highlighted that many scholars have expressed the importance of credit in agricultural development, regarding it as the life-blood of modern society which plays an important role in the developmental process, the demand for which grows as development progresses. He defines agricultural credit as a borrowed resource (in

cash or in kind) which can be used to acquire basic inputs that will enhance agricultural production. He declared that modernization of agriculture through the use of improved technologies requires some considerable amount of capital investment. Small farmers especially in the developing countries cannot generate enough of this capital from their own savings. If they are to expand, farmers have to raise some additional capital through the formal or informal sources of agricultural credit.

Ogunfowora *et al* (1972) as cited by Olukosi (1988), draws the importance of agricultural credit in the following perspectives:

- Many innovations in farming inevitably increase the capital requirement of farmers. The low rate of adoption of improved practices is partly due to inadequate financial resources use in implementing it.
- Majority of farmers produce at subsistent level and there is usually small surplus out of which savings for future investment can be made.
- Seasonal nature of farm production and income generation creates needs for short and medium term loans for financing the production activities.
- The supply of loan may strengthen the farmer's position in the disposal of his produce. It enables the farmer to dispose his products at the time of competitive price.

- Credit is needed to expand the scale of farm operation and for introducing supplementary enterprises, which could increase labour utilization and promote steady flow of income.

Some factors were also identified which make provision of credit to farmers a necessity if agricultural production and related activities are to be modernized. Igben (1973), as cited by Olukosi (1988), identified the factors as the physical nature of some crop and livestock enterprises such as long gestation period of production, the economic factors, such as purchase and use of fertilizers, improved seeds, animals and mechanical power.

Diagne and Zeller (2001), affirmed that poor rural household in developing countries lack adequate access to credit. Many development professionals believe that this lack of credit has negative consequences for farmers' agricultural productivity, food security, health and overall household welfare. Improved access to credit will, therefore, help the poor rural households to engage in more productive income generating activities both on and off the farm and thus raise their living standard.

According to Desai and Mellor (1993), credit is essential for agricultural development. Circumstantial evidence shows that where agriculture has grown rapidly, institutional credit has expanded more quickly as found with grameen of

Bangladash. Although farmers as producers greatly prefer to hold their savings in physical productive assets on their farms, they nevertheless must rely on external credit at various points in time, basically, because the realization of income and the act of expenditure do not occurs at the same time.

2.7 Sources of Rural Finance

According to Nelson *et al* (1973), rural finance is concerned with two distinct activities – savings and borrowing. They view agricultural finance as a "continuum between pure equity and pure debt financing" and emphasize savings and borrowing as the main sources of capital in developing countries. They argued that savings represent that part of income not spent on current consumption. Savings constitute the backbone of agricultural capital formation because it provides both the capital as well as the risk bearing ability and a demonstrated capacity to earn and save.

In developing countries like Nigeria where most of the people are rural dwellers and rarely live above the subsistence level, the rate of voluntary savings is abysmally low and the mobilization of savings under such condition is difficult. Iniodu and Ukpak (1996), Wisniwski (1999) and Morduch and Haley (2001), further affirmed the general agreement among experts that savings are the most reliable, most productive and most profitable source of agricultural finance which

can be exploited for effective economic management. But savings can be mobilized and put into use only if there is a local financial institution. In fact, the main problem of capital formation in many rural areas is not so much the paucity of savings but the lack of institutions to channel the existing or latent surplus into productive investment. They, therefore, argued that since mobilization of rural savings for capital formation in the short run poses a serious problem, there is need for an alternative source of rural finance for the required agricultural transformation.

Ruben and Clercx (2004) and Ravi (2004), classified sources of rural finance into two categories; institutional and non-institutional sources. Institutional is further divided into domestic and foreign sources. Institutional sources are the formal source that provides funds to the agricultural sector. They comprise of commercial and development banks, cooperative institutions, government credit institutions and insurance bodies. The informal sources of finance include professional money lenders, friends, relatives and local unions and associations.

But Desai and Mellor (1993), have justified the preference for formal or institutional source of finance to informal sources due to the simple fact that resources of informal lenders are inadequate and ill-suited for modernization as they are unable to lend for long tenured period as to enable farmers acquire

productive assets and purchase high yielding inputs. They argued that informal lenders have not been able to mobilize financial deposits because their deposit facilities are inadequate, unsafe, Untrustworthy or less remunerative. The informal credit segment is also fragmented, imperfect and isolated. They cited Grameen and Sonali Bank of Bangladesh as good examples of successful rural financial institutions. Whichever source of financing is adopted by farmers, access to and use of rural credit services are basically considered as important incentives for adjusting resource allocation at the farm household level. Three functional attributes of rural finance distinguished by Ruben and Clercx (2004) are; improving the access to external resources, enhancing the productivity of private resources (land and labour) and abilities of risk-taking behaviour. The last function is particularly important since credit supply can only lead to resource re-allocation when farmers experience increasing certainty regarding expected revenue streams.

2.8 Theoretical Basis of Credit

According to Iniodu and Ukpak (1996), classical economic theory had stated that both lending and borrowing are interest elastics and that there exist a positive rate of interest at which the demand for and supply of loanable funds are equal. On the demand side, farmers borrow to facilitate the acquisition of capital goods – farm tools, implements, machinery, buildings, chemicals etc. In classical economic

view, the increased employment of capital like the increase employment of any other input eventually results in a positive but diminishing marginal product. A rational farmer, therefore, borrows only if the productivity of the additional capital justifies the payment of interest on the borrowed funds at the existing rate of interest. Thus, all things being equal, borrowing for investment will continue until the expected marginal rate of return from borrower funds equal the rate of interest. On the supply side or the lender's side, the traditional theory implies that lenders prefer consumption now to consumption in the future. They would therefore surrender their right to current consumption only if they expect positive returns from lending. In fact, lending is seen as an upward sloping function of the rate of interest. Lending involves some risk especially the risk of loss of financial capital in case of default. Because lending has cost which significantly influence lending decisions, these decisions depends not only on the rate of interest alone but on other economic, social and financial considerations.

According to Adams (1988), credit involves two parties; a lender and a borrower. It transfers the control of either liquid or non-liquid assets from the lender to the borrower based on agreed terms. It, thus, involve a price which is the interest rate charged by the lender to the borrower. A "lender" in a credit transaction is the individual or institution that mediates and supply or provides credit to potential

borrower. A “borrower” on the other hand is the person or enterprise who has demand for and obtains credit in order to achieve inter-temporal transfers of consumption.

2.9 Government intervention in agricultural credits in Nigeria

Olukosi (1988), specifically explained that in view of the recognition of the importance of agricultural credit, the federal government of Nigeria formulated a number of policies in this regard. The earliest attempt at establishing a formal credit system in Nigeria, according to him, dates back to 1930 when the then native administration gave loans for the purpose of mixed farming in the then Northern Nigeria. But the first nationwide attempt at providing credit for both agricultural and industrial development was in 1946 when the Nigeria Local Development Board was established and which was later succeeded by three Regional Local Development Boards to ensure better geographical coverage. And in 1973, the Nigeria agricultural credit bank was established. The name was later changed to Nigeria Agricultural and Cooperative bank (NACB) in 1977/78 to embrace cooperative activities and emphasize the importance of credit in agricultural productions. And in the quest to boost efficient credit delivery to the agricultural sector, inculcate good banking habit among rural populace and alleviate mass poverty especially among the urban and rural resource-poor, the Federal

Government in December 1999 merged the defunct Nigerian Agricultural and Cooperative Bank (NACB) with Peoples Bank of Nigeria (PBN) and Family Economic Advancement Programme (FEAP) to form the new Nigeria Agriculture Cooperative and Rural Development Bank (NACRDB). It was recently renamed Bank of Agriculture (BOA). With this expansion the bank is expected to undertake a more comprehensive coverage of agricultural sector through adequate funding of viable farm and non-farm production activities (FMARD, 2002).

Other efforts to induce a positive participation of banks in developing the rural financial market have been catalyzed by CBN through its two initiatives of rural banking and agricultural credit guarantee scheme fund established in 1977. The ACGSF scheme guarantee 75% of the loan granted to farmers by commercial banks. Rural banking was equally initiated to remedy the anomaly of the skewed distribution of commercial banks between urban and rural areas. The CBN constrained commercial banks to establish a specified number of branches in the rural areas (Olukosi, 1988).

The specific objectives of the rural banking scheme were given by Iniodu and Ukpak (1996) as follows:

- To encourage banking habit among the rural populace.
- Mobilize savings from rural areas and channel them to rural

development.

- Transform the rural economy by promoting modern agricultural practice, agro-based industries and gainful employment for the rural populace.

Certain incentives proffered to induce commercial banks to participate and implement the rural banking scheme were:

- Waiving feasibility report as pre-condition for the opening of bank branches.
- Permitting the banks to write-off the capital cost of erecting office premises and other building infrastructures within a period of three years.
- Exclusion of loans and advances in the first two years in the computation of growth rate of the bank's loan and advances.

2.10 Performance of Agricultural Financing Institutions

The performance of institutional credit can be considered in the light of how well they have achieved the objectives for which they were set up. For example the twin

objectives of rural banking scheme which centred around the mobilization of savings from the rural area and lending significant portion of such funds to rural entrepreneurs for rapid economic transformation has not been achieved. This view was expressed by Olukosi (1988) and re-affirmed by Iniodu and Ukpak (1996).

There seems to be two-way problems in the implementation of rural banking programmes in the country as postulated by Iniodu and Ukpak (1996). Firstly, small-scale farmers were reluctant to deposit their money with the rural branches due to procedural requirement of depositing and withdrawal of cash but most importantly their lack of confidence in the banking system. The initial lack of confidence is compounded by the later distressed condition of many commercial banks. These circumstances seem to have caused the rural dwellers to develop apathy, distrust and scorn for the banking system. Secondly, banks on their part shy away from making loan available to small-scale farmers and other rural dwellers due to high cost of loan administration and monitoring, lack of statutory certificate of occupancy and ability of farmers to provide alternative security and the fact that they are not fully and firmly convinced of the merits of rural banking in developing economies like Nigeria. The banks appear more interested in deposit mobilization aspects of their function at the expense of credit aspect. Philip (2001), also proffered an assessment of the institutional sources of lending and concludes

that the general performance has not been quite satisfactory. He averred that credit administration by Nigeria Agricultural and co-operative bank (NACB) now Bank of Agriculture (BOA) was characterized by wide divergence between loan approval and disbursement. Most of the funds allocated by BA came from the federal government meaning that long term survival of the institution had always rested squarely on the loan recovery. He further stressed that the Nigeria Agricultural Insurance Scheme under the management of Nigeria Agricultural Insurance Commission (NAIC) was established essentially to provide linkage between the insurance scheme, financing agencies and prospective loan beneficiaries by providing insurance cover against special perils has not been successful. The scheme is expected to encourage lenders to provide funds to agriculture without fear of loss due to natural hazards in addition to the ACGSF guarantee. But in practice, the expected linkage between the ACGSF scheme, lending agencies and NAIC has not been satisfactorily achieved. One of the problems relates to rampant loan default among borrowers.

According to various agricultural credits guarantee scheme fund (ACGSF) annual reports of 1978, 1980, 1981, 1982, 1983 and 1985 as cited by Philip (2001), factors that contributes to loan default among Nigerian farmers are diverse. First are the factors which are beyond the farmers control such as drought, diseases, flood and

other natural hazards. Secondly, default in loan repayment has been traced to the banks, partly due to the delay in processing farmers' loan applications, infrequent visits to loan beneficiaries, granting of inadequate loans, enforcement of unrealistic repayment schedules and improper evaluation of funded projects and irregular disbursement of approved loans.

According to Nnanna *et al* (2004), the informal financial markets in Nigeria were found to impact significantly on savings mobilization, encouraging commercial activities, communal development and contributing generally to economic growth, in fact they filled the gap created by the absence of banks in the rural areas, harnessing funds from the surplus-economic units and transferring them to the deficient sectors of the rural areas. But despite their seemingly positive contributions, the authors have identified shortcomings inherent in their operations, management and organization of these sources. Their unregulated activities by law inadvertently promote exploitative tendencies and unfair practices. The issue of high interest rates and unconventional charges are features of the operation of the informal credit markets. Most of the informal financial institutions have no good record, no accounting system and no established auditing process. There are no legal framework to prosecute defaulters and promoters besides peer pressure and communal sanctions. Even though the interest rate in informal credits have been

reported to be higher than the one charged by formal institutions, Olukosi (1988), has reported that repayment rates have been high because the informal lenders are usually in close proximity with farmers, they are better able to evaluate the credit worthiness of the farmers and therefore loan out funds commensurate with the farmers repayment capacity. Though, there is apparent high repayment performance in the informal credit sector, incidence of default has also been reported. The incidence of loan default in informal sector is due to high interest rate charged by private money lenders. The interest rate is a pervasive element on the volume of net cost flow.

2.11 Classification of Credit Agencies

According to Upton (1979), credit agencies are frequently classified into two groups: formal and informal. Formal institutions include banks and cooperatives credit union; while informal agencies may be further sub-divided into two groups. On one hand, family members, kinsmen and farmers' credit association (such as esusu clubs in Nigeria) lend money or assets at little or no interest. On the other hand, village traders and moneylenders sometimes charged very high interest rates. None the less, informal sources, even of the latter kind have certain advantages over formal institutions.

- They are convenient, available locally, require no documentation and can provide credit quickly.
- The informal moneylender has local knowledge in appraising household credit need and credit worthiness.
- There is little risk of default because the lender is in position to apply pressure on the borrower to ensure payment.
- Administrative costs are low.
- With some type of informal credit such as the caretaking of livestock and pledging of tree crops, the risks of borrowing are shared between the two parties involved.

The disadvantages of informal credit are that:

(i) The borrower feels he has an obligation to the lender and loses his independence.

(ii) There are few alternative sources to choose from, and;

(iii) Only short-term and relatively small loans are available.

Formal credit institutions have standardised lending procedure and make loans on contractual basis. Such agencies may make longer-term and large loans available but they face special problems in lending to farmers:

(i) Administrative costs are high.

(ii) Compared with urban industry, farmers' loans are relatively small.

(iii) Many farmers lack knowledge and experience of formal application procedure.

(iv) Agricultural production being a risky venture, the risk of default is high.

(v) Farmers in the rural areas lack suitable collateral.

2.12 Linkage of Formal and Informal Financial Sectors

Aryeetey (1995), identify three major linkages in the financial credit market. The first is where the application of formal credit compliments with or substitutes for the application of informal credit in the finance of economic activity. The second is where the two operate in a complementary manner. The third is where informal credit suppliers act as conduct or intermediary between formal lenders and borrowers. A fourth situation could also be added where formal institutions lend out informally mobilized deposit as observed between savings collectors and banks, but this is not of immediate consequence to the lending potential of informal arrangement. He added that in considering competition between formal and informal finance, it is necessary to consider the question of whether financial institutions providing relatively cheap credit to borrowers push informal lenders out of business. There is an apparent lack of data on general household indebtedness to both formal and informal units making comparison difficult. The

complimentary relationship between the two sectors would exist if the growth in the demand for one was not at the expense of the other. If growth in investment which relies on formal credit create additional capacity that can be met only with informal credit in order to maintain the economy at equilibrium position, the application of the two types of credit may be regarded as complementary. Therefore, taking into account the role of informal finance as a provider of residual finance, it is generally expected that the joint impact of the two sectors on the economy will depend on the volume of residual financing done by informal finance in relation to total financing requirements. Residual financing is regarded here as additional informal finance coming to investors in excess of what is available to them from the formal system.

According to Nwanna (1994), the above scenario poses a puzzle for agricultural growth and development in the country. The formal sector of the credit market has adequate funds but is inaccessible to small farmers; the informal sector is easily accessible to small farmers but has limited financial resources. The question then is how to link the "highly liquid but inaccessible sector" with the "highly accessible but less liquid sector" for an effective and efficient agricultural loan delivery system.

It is important to point out that government regulation as contained in the Central Bank of Nigeria occasional credit guidelines may not adequately guarantee the availability of credit to rural farmers. The development of an all-encompassing financial managerial approach becomes desirable. The informal financial institutions constitute the appropriate channel through which financial resources from the formal sector can be made available to farmers for agricultural investment with minimum risk. What is needed is a sound on-lending arrangement between formal financial institutions and recognized informal financial institutions (Iniodu and Ukpak, 1996; Aryeetey, 1998; and Nwanna, 1994).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the study area

Kano state is approximately located between latitude $10^0$35' and 13^0 02' north and between longitude $7^0$30' and 10^0 35' east and as such it is part of sudano-sahelian zone of Nigeria (Olofin *et al,* 2008). It shares boundaries with Jigawa State to the north east, Bauchi State to the east, Katsina State to the north-west and Kaduna State to the south. The state is administratively divided into 44 local government areas. Kano has a total land area of 43000 square kilometres. According to NPC (2006), the state has a population of 9.4million with 446 person/Km^2 density. The estimated population as at 2008, 2009 and 2010 will be 9.88, 10.11 and 10.36 million respectively at 2.5% annual increase. The annual rainfall of the state ranges between 420mm to 1000m and temperature is averagely warm throughout the year at about 27^0c $\pm$ 7^0c. The natural vegetation of the environment is Sudan Savannah which is a tropical grassland with scattered trees such as baobao, acacia and locust bean trees (Olofin and Tanko, 2002).

The cropping system in the study areas is mostly undertaken under the rain fed and irrigated conditions and majority of farmers are small-scale holders who grow their crops solely or in mixtures with less than 2.5 ha/farming house hold and their

resources are meagre. The upland crops commonly grown are millet, sorghum, groundnut, cowpea and maize. While the low land fadama crops grown in the state includes tomato, onions, pepper and other vegetables with rice and wheat grown in the flood plains and irrigated dam areas. In fact agriculture is the backbone of the Kano State's economy followed by commerce. Other commercial crops grown in the state are cotton and sesame seed.

The twelve villages in the three KNARDA Zonal headquarters were chosen as the study areas because of availability of fadamas, earth dams and irrigation facilities and they include the following:

i) Zone one comprising Kura, Bunkure, Garun babba and Danhassan villages which part of Kano river project phase I.

ii) Zone two comprising Babban ruga, Wailari, Tukwi and Danmarke villages which surrounds the Thomas Dam in Makoda local government.

iii) Zone three comprising Wudil, Gogel, Ajingi and Kafinciri villages which are also part of Kano river project phase I (see appendix III).

3.2 Sampling procedure

A three-stage sampling technique was used. To this effect, a reconnaissance survey and census were conducted in the three Kano state Agricultural and Rural Development Authority (KNARDA) zones in August 2009 to identify the villages

that are actively involved in intensive tomato production and who have access to formal or informal sources of agricultural credit. Thirty six villages were identified from the three zones i.e. 12 villages from each zone. The second stage involved random selection of four villages of tomato farmers from each zone and these constituted a population of 600 tomato farmers. The last stage involved proportionate random sampling of 120 tomato farmers who benefitted from either informal or formal credit (using 20% of the population of tomato farmers in each village). The numbers of farmers interviewed from each community are as indicated in table 3.1:

Table 3.1: Distribution of tomato farmers and farmers interviewed in the study areas.

KNARDA Zone	Villages	Tomato farmers Population	Farmers selected
One-(Rano)	Kura,Imawa	121	24
	Bunkure	39	8
	G/babba	48	10
	D/hassan	42	8
Two-(D/batta)	B/ruga	30	6
	Wailari	40	8
	Tukwi	40	8
	D/marke	31	6
Three-(Gaya)	Wudil	59	12
	Gogel	50	10
	Kafinciri	59	12
	Ajingi	41	8
Total		600	120

Source: Field survey, 2009.

3.3 Data collection

The data for the study was collected through primary and secondary sources. For the primary source, interview method was used with the aid of structured questionnaire for farmers (see appendix I) and institutions (see appendix II) during 2009/2010 farming seasons (September 2009 and March 2010). Since some of the farmers could neither read nor write English, the questionnaire was administered by the researcher with the help of experienced and well-trained enumerators of the planning, monitoring and evaluation department of KNARDA in a one month visit interview. The questionnaire was pre-tested in July 2009 to check for any ambiguity capable of causing misunderstanding on the part of the farmers. Out of 120 questionnaire distributed to the sampled tomato farmers, 66 were answered by farmers using informal sources of credit and 54 were answered by farmers using formal sources of credit. Secondary data was sourced from Unity banks Bank of Agriculture in the area, existing literature and other related reports.

The Primary data collected included:

1 Socio-economic data: Such as age, educational status, household size, farming experience, farm size e.t.c. were collected.

2. Farm production data: such as land area cultivated (ha), variety of tomato grown, amount and cost of labour used per ha, quantity and cost of inputs,

quantity and price of output, source of credit, terms of credit disbursement, interest rate, income from farming and non-farming sources.

3. Membership of cooperative society.
4. Sources of credit.
5. Sources of inputs.
6. Market outlets.
7. Interest rate paid
8. Amount applied for and amount obtained.
9. Time of application and time obtained.

Secondary data collection included:

1. Criteria for granting loan
2. Amount of credit requested for and amount obtained
3. Rate of interest from informal and formal sources.

All the secondary data were sourced from Bank of Agriculture (BA) annual report (2008) and Unity Bank plc. Agricultural Department annual report (2008).

3.4 Analytical techniques

The analytical tools used in achieving the objectives of the study include the following:

(i) Descriptive statistics

(ii) Farm budgeting

(iii) Production function analysis

3.4.1 *Descriptive statistics*

These are in form of measures of central tendencies; such as mean, median, mode, frequency distribution, percentages etc and measures dispersion; such as range, standard deviation etc and these were used to achieve objectives i, ii and vi.

3.4.2 *Farm budgeting*

Here one of the budgeting techniques the net farm income was used to evaluate the cost and return to obtain a net profit. It represents the difference between the value of output and total cost. It is simply calculated as the difference between the total revenue and the total cost which is expressed as follows:

NFI=TR-TC .....(1)

Where:

NFI = Net Farm Income (N)

TR=Total Revenue (N)

TC=Total Cost (Variable Cost + Fixed Cost) (N). This tool was used to achieve objective v of the study.

3.4.3 *Production function analysis.*

Production function analysis was used to achieve objectives iii and iv of the study. A production function expresses the physical relationship between inputs and outputs in a production process. Specifically the implicit form of the model is as follows:

$$Y=F(X_1,X_2,X_3,X_4,X_5,X_6,X_7,u) \quad \text{.....(2)}$$

Where:

Y =Output of Tomato (kg)

X_1 =Farm size (Ha)

X_2 =Quantity of Fertilizer (Kg)

X_3 =Quantity of Manure (Kg)

X_4 =Labour (Man -hour)

X_5 =Seeds (Kg)

X_6 =Amount of water used (litre)

X_7 =chemicals used (litre)

u =error term.

The functional forms:

The three functional forms (Linear, Semi Log and Double Log) were fitted to the data and the Cobb-Douglass production function (double log) was however selected as the lead equation or line of best fit for further analysis.

The criteria that guided the selection of the lead equation were:-

-The value of the coefficient of multiple determinations (R^2)

-Appropriateness of the signs of the regression coefficients

-Significance of the t-value

-Significance of the f-value

The functional forms were specified as:

(i) Linear production function;

$Y=a+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6+b_7x_7+ u$.....(3)

Where:

Y, x_{1-7} are as already defined in the implicit form

b_1-b_7 is regression coefficients.

a=constant

u=error term

(ii) Semi-log production function;

$Y=a+b_1\log x_1+b_2\log x_2+b_3\log x_3+b_4\log x_4+b_5\log x_5+b_6\log x_6+b_7\log x_7+u$..... (4)

Where:

Y, x_{1-7} are as already defined in the implicit form

b_1-b_7 is regression coefficients.

a=constant

u=error term

(iii) Cobb-Douglas production function;

$LogY=a+b_1logx_1+b_2logx_2+b_3logx_3+b_4logx_4+b_5logx_5+b_6logx_6+$

$b_7logx_7+ u$.....(5)

Where:

Y, x_{1-7} are as already defined in the implicit form

b_1-b_7 is regression coefficients.

a=constant

u=error term

Assumptions of Cobb-Douglas function:

1. That all inputs have been included in the function.
2. That the b (regression) coefficient is less than 1.
3. That the response curve shows diminishing marginal returns.
4. That the total and marginal product curves tend to flatten out into an almost straight line at high levels of inputs.
5. That the least combination (ratio) of resources is the same at all levels of output.

Advantages of Cobb-Douglas function:

1. It is easy to estimate.

2. It is used to estimate return to scale.
3. It may show diminishing marginal returns and therefore suitable for agricultural production.

Disadvantages of Cobb-Douglas function:

1. It cannot show both increasing and diminishing marginal returns in a single response curve.
2. It does not give technical optimum and may lead to over-estimates of economic optimum.
3. The implication of a constant elasticity of response at all levels may restrict the usefulness of this function.

Marginal productivity and resource use efficiency:

The marginal value product (MVP) of the resources used was estimated by multiplying the marginal physical product and the prices of the input. The value was then compared with the cost of the resources, i.e. Marginal Factor Cost (MFC) or Unit factor cost (UFC) in order to make inference on efficiency of resource use. The following was estimated to determine the efficiency of resource use:

$$r=MVP/MFC \quad \text{.....(6)}$$

Where:

r=efficiency ratio

r=1 means resources employed by the farmer are efficiently utilized.

r>1 means resources employed by the farmer are under-utilized

r<1 means resources employed by the farmer are over-utilized

The efficiency of the input occurs when

$$MVPx_i=MFC=Px_i \quad \text{.....(7)}$$

Where:

$MVP_{yi}=MPPx_{i.}\ Py$

$MFC= UFC=Px_i$

Px_i=unit price of extra variable input x

Py=unit price of output

MPPxi=marginal physical product of input xi

MVP=marginal value product of output

MFC=marginal factor cost ($\Delta TC/\Delta x_i=Px_i$)

The elasticity of production (Ep) was estimated and the sum of the elasticity was used to estimate the return to scale as follows:-

$$EpX_i=\Delta y/\Delta x_{i.}\ x_i/Y \quad \text{.....(8)}$$

$$EpX_i=b_i/x_{i.}\ x_i/Y \text{.....(9)}$$

$$\sum_{i=1}^{n} EpX_i=b_i/Y \quad \text{.....(10)}$$

Where:

$\sum_{i=1}^{n}$ EpXi=MRTS

Ep=Elasticity of production

X_i=the input under consideration

Y=output

$\Delta y/\Delta x_i$=marginal product of x_i

Y/x_i=average product of x_i

b_i=elasticity coefficient of $_i$ input

MRTS=marginal rate of technical substitution.

3.4.4 *Z-Statistic*

This is used for the comparison of two means especially when the sample size is larger than 30. It was used to compare the means of farm size, amount of loan received, total cost of production, output and profit of the two groups of farmers. The Z-statistic is expressed as follows:

$$Z = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad \text{.....(11)}$$

Where Z = calculated Z value

X_1 = Mean of tomato farmers using formal sources of credit

X_2 = Mean of tomato farmers using informal sources of credit

S_1= Standard deviation of tomato farmers using formal sources of credit

S_2 = Standard deviation of tomato farmers using informal sources of credit

n_1= Sample size of tomato farmers using formal sources of credit

n_2 = Sample size of tomato farmers using informal sources of credit

3.5 Definition and measurement of variables

Output of tomato in Kg (Y): This is the quantity of tomato harvested by farmers. It represents the dependent variable in the model and measured in kilogramme (Kg). One medium basket of tomato is equivalent to 25kg

Farm size in Ha (x_1): This is the land area being cultivated by the tomato farmer. It is expected to have a positive influence on the output (ceteris paribus) and is measured in hectares (ha). The farm size of indi

Quantity of fertilizer in Kg (x_2): This is the inorganic fertilizer that is used in the production of tomato and is measured kg. The acquisition of this input is critical which makes the sourcing of a capital in form of loan by two groups of farmers in the study areas a priority.

Quantity of manure in Kg (x_3): This is the organic fertilizer that is used either solely or in combination with inorganic fertilizer and is measured in kg.

Labour in man- hour (x_4): This consists of family and hired labour and measured in man-hours. Following Norman (1973), children aged 7-14 years are accorded

0.50 of male equivalent, female adult of 15-64 years is accorded 0.75 of male equivalent and male adult of 15-64 years is accorded 1.00.

Quantity of Seeds in kg (x_5): Seeds are input variables which farmers plant on their farm and they usually get them from three sources; either certified seed from Seed Company, buy from other farmers who grow the seeds on commercial basis or use the seed from their previous year harvest and is measured in Kg.

Amount of water used in litres (x_6): This is the irrigation water a in one production cycle and is measured in litres using time as proxy. Using a stop watch a time taken to fill one 200liter drum is noted. The process was repeated three times to get an average flow rate of 2litre/sec. It is an input variable in the study which is supplied and controlled by the government at a fixed price.

Chemicals used in litres (x_7): These are pesticides, insecticide and herbicides used by the farmer during the production period in order to control insect, disease and weeds. It is measured in litres.

CHAPTER FOUR

4.0 PRESENTATION AND DISCUSSION OF RESULTS

4.1 Socio-economic Characteristics of the Respondents

This section presents the socio-economic characteristics of tomato farmers using formal and informal sources of agricultural credit in the study areas which include age, level of education, household size, farming experience, farm size, types of farming and mode of land acquisition.

4.1.1 *Age Distribution of the Respondents*

Age is very important in agricultural production because it determines the physical strength of the farmer. Also the young people tend to withstand stress and put more time in various farming operations, this will likely result to an increase in output.

The result presented in table 4.1 shows that the farmers' age ranged between 21 and 70 years. Majority of farmers using informal source of credit (83%) were between the ages of 30-50 years while those using formal source (76%) were between the ages of 30-50 years. Only 6% of the farmers using informal source are 51 years and above. While only 4% of the farmers using formal sources are 51 years and above. The mean age were 33 and 34 years for farmers using informal

and formal sources of credit respectively. This implies that majority of the farmers in the two categories of farmers were in the middle or active age group. The result obtained is similar to the findings of Muhammed (2010), which states that majority of vegetable growers are below the age of fifty and therefore still in their active age. The implication of age on credit be it from informal or formal credit source is that there is possibility of farmers in middle or active age group to access to credit than old or aged farmers.

Table 4.1 Age Distribution of the Respondents

Age group (yrs)	Informal sources	Formal sources
21-30	7 (11)	11 (20)
31-40	28 (42)	23 (43)
41-50	27 (41)	18 (33)
51-60	2 (3)	2 (4)
61-70	2 (3)	Nil
Total	**66 (100)**	**54 (100)**
	mean=33	**mean=34**

Source: Field Survey, 2009

Figures in parenthesis are percentages

4.1.2 *Respondents' Level of Education*

The level of education affects the type of decision farmers take in agricultural production and determines the level of opportunities available to improve livelihood strategies and managerial capacity in agricultural production. The result presented in table 4.2 shows that the farmers using both source of credit had one form of education or the other. This implies that the literacy level among the farmers in the study areas is relatively high which makes it very likely for the two groups of farmers to use emerging opportunities adopt new innovations. However, farmers using formal sources of credit are more literate than farmers using informal sources of credit. About 65% of the farmers using formal source of credit had one form of formal education or the other. While 35% had non formal education. Among the farmers using informal source of credit 55% had one form of formal education or the other while 45% had non formal education. The finding is similar to the result obtained by Njoku (1991) in his study on factors influencing adoption of improved oil palm production technologies by small scale farmers in Imo state Nigeria in which he noted that the more educated a farmer the more the chances that he/she will utilize available opportunity and adopt innovation than uneducated ones.

Table 4.2 Distribution of the Respondents by their Level of Education

Level of Education	Informal sources	Formal sources

Primary Education	18 (28)	19 (35)
Secondary Education	10 (20)	10 (19)
Tertiary Education	5 (7)	6 (11)
Non-formal Education	33 (45)	19 (35)
Total	**66 (100)**	**54 (100)**

Source: Field Survey, 2009

Figures in parenthesis are percentages

4.1.3 *Household Size*

The result presented in table 4.3 shows that the size of the households in the study area ranged between 5 and 25 people among farmers using informal source of credit while 10 to 25 people were observed among farmers using formal source of credit. Majority of the farmers using informal source (45%) and farmers using formal source (50%) had 6 to 10 people in the household respectively. The average household sizes for farmers using informal and formal sources of credit were 11 and 10 people respectively. The reason for large household size in the study areas may be connected with the religious influence and type of family system practiced there and the average household size of farmers using informal credit is higher than that of farmers using formal source of credit. However, on the other hand large household size may increase household consumption expenditure which competes

with the money that could be used for production purposes. The implication of household size on the two types of credit is twofold. First it may be that higher number of people in the house due consumption and other basic needs may compete with the meagre resources. Therefore credit collected for purpose of production may be diverted into consumption or satisfying other basic needs. Secondly, high number of people in the household may a blessing in term of labour input thereby reducing cost of hired labour which will allow the tomato farmer to channel the loan to other input acquisition such as fertilizer. The finding is similar to that of Ammani (2008).

Table 4.3 Distribution of the Respondents by their Size of Household

Household Size	Informal sources	Formal sources
1-5	1 (2)	Nil
6-10	30(45)	27 (50)
11-15	16 (25)	10 (18)
16-20	7 (10.0)	8 (15)
Above 20	12 (18)	9 (17)
Total	**66 (100)**	**54 (100)**
	mean=11	**mean=10**

Source: Field Survey, 2009

Figures in parenthesis are percentages

4.1.4 *Farming Experience in Tomato Production*

Experience plays a significant role in agricultural production. It is expected that the higher the farmer's experience the better will be the productive capacity of the farmer.

The results presented in table 4.4 shows that majority of farmers (42%) using informal source of credit had 21-30 years of farming experience while (43%) of farmers using formal source had 11-20 years of farming experience. Only 15% and 14% of the two groups of farmers had less than 11 years of farming experience respectively. From the result it can be observed that the farmers using informal sources of credit are more experienced than the farmers using formal source of credit. The average farming experience for both group of farmers is 19years. The implication of this finding is that experienced farmers are more likely to make sound decision that will increase his output, income and savings (ceteris paribus).

Table 4.4 Distribution of the Respondents by their Farming Experience in Tomato Production

Farming Exp. (yrs)	Informal sources	Formal sources
1-10	10 (15)	8 (14)
11-20	20 (30)	23 (43)
21-30	28 (42)	17 (32)
31-40	2 (3)	6 (11)
Above 40	6 (10)	Nil
Total	**66 (100)**	**54(100)**
	mean=19yrs	**mean=19yrs**

Source: Field Survey, 2009

Figures in parenthesis are percentages

4.1.5 *Farm Size*

The result presented in table 4.5 shows that more than three quarter (75%) of both categories of farmers cultivate less than 1.6ha of land. Farm size rs among the two categories of farmers ranges between 0.5ha to 2.0ha. This implies that tomato farmers using both sources of credit are predominantly small scale farmers. This is because majority of the farmers have small farm size resulting from inheritance or hire. Small farm size is an impediment to agricultural mechanization because it will be difficult to use farm machines on small and fragmented individual farms. The mean farm size of each group is 1.21ha for farmers using informal sources of credit and 1.31ha for farmers using formal sources of credit. The finding further reveals that farmers in the study areas cultivate larger farm size (1.21ha and 1.31ha) than that reported by Turner (1984) and Sintiki (1990) where the average farm sizes were reported to be 0.2ha and 0.498ha respectively; and this further shows a gradual increase in the scale of production in small scale farming in the study areas. However, the finding of the study is similar to that of Muhammed (2010) who reported a farm size range of 0.2-2.9ha and an average farm size of 1.37ha for the farmers. Most of the farms used by the tomato farmers are hired or

inherited because they are farmlands cleared by the Federal or State governments in the dam or irrigation areas. The rent per hectare ranges between N3000-N7000/season depending on whether the hire is from government or individual. Size of farmland may not be affected directly by credit received but if increase, it may have effect on the level of output if other inputs are increased.

Statistical test of significance:

The mean farm size used by the two groups of farmers were further put to statistical test to verify if there was significant difference between the farm size used by the tomato farmers using formal sources of credit and farm size used by tomato farmers using informal sources of credit using z-statistic. The result reveals that calculated z-statistic was 0.01, whereas the tabulated z-statistic for the two tailed test at 5% level of significance range between -1.96 to +1.96. The calculated (0.01) lies within the range, hence we accept our null hypothesis which states that there is no significant difference between the farm size used by tomato farmers using formal sources of credit and farm size used by tomato farmers using informal sources of credit.

Table 4.5 Distribution of the Respondents by their Farm Size

Farm Size (ha)	Informal sources	Formal sources
<1.0	30 (46)	17 (33)
1.0-1.5	29 (44)	23 (42)

1.5-2.0	7 (10)	14 (25)
2.0-2.5	Nil	Nil
Total	**66 (100)**	**54 (100)**
	mean=1.21ha, SD=40	**mean=1.31ha, SD=42**

Source: Field Survey, 2009

Figures in parenthesis are percentages

4.1.6 *Mode of Land Acquisition*

The result presented in table 4.6 shows that majority of the farmers (66%) using informal source of credit acquired their lands through inheritance. However, 17% of them acquired their land through hire and purchase respectively. On the other hand farmers using formal source of credit acquire their farm land through hire (33%), purchase (15%) and inheritance (52%). The implication of this result is that majority of the farmer using informal source of credit (66%) don't pay for land rent and therefore do not consider cost of land in production process while 34% of them consider cost of land as part of the cost. However, those farmers using formal credit (48%) consider land as part of their total cost but 52% of farmers in this group acquire their land through inheritance and therefore do not consider cost of land as part of the total cost of production. The result further revealed that, the right to the use of land in the study areas is to a large extent customary. Generally

mode of land acquisition in the study areas is through inheritance, hire and purchase. Olukosi and Erhabor (1988) stated that in some subsistence farming communities, pieces of land are acquired through inheritance passed from one generation to another while others are either bought or rented.

Most farmlands in the study areas were acquired through inheritance and hire. The average rent for hiring a hectare of land from government is N3000/ha/season while that of hiring a ha of land from individual is N7000/ha/season. The Implication of is that since most of the land in the study areas were inherited and the cost of hiring is not so exorbitant credit has little influence or direct bearing on mode of land acquisition.

Table 4.6 Distribution of the Respondents by their Mode of Land Acquisition

Mode of Land Acquisition	Informal sources	Formal sources
Hired	11 (17)	18 (33)
Purchased	11 (17)	8 (15)
Inherited	44 (66)	28 (52)
Total	**66 (100)**	**54 (100)**

Source: Field Survey, 2009

Figures in parenthesis are percentages

4.1.7 *Season of Farming*

The result presented in table 4.7 reveals that majority of tomato farmers (81%) and (67%) using formal and informal source of credit respectively were producing tomato both in the rainy and dry season. Only 2% and 4% of the farmers using informal and formal source of credit respectively were rain fed tomato farmers. Similarly only 11% and 14% of farmers using informal and formal sources of credit respectively were dry season tomato farmers. Production of tomato by the two groups of farmers in the study areas is predominantly dry and rainy season and this may be attributed to the availability of irrigation facilities; dry and rainy season varieties that strive better in the study areas. The implication of this is that there is production of tomato to some extent almost all year round in the study areas hence the need to access more credit facilities from the two sources.

Table 4.7 Distribution of the Respondents by Season of Farming

Season of Farming	**Informal source**	**Formal source**
Dry Season	11(17)	14 (25)
Rain fed	1 (2)	4 (8)
Both	54 (81)	36 (67)
Total	**66 (100)**	**54 (100)**

Source: Field Survey, 2009

Figures in parenthesis are percentages

4.2 Amount of Credit Requested and Credit Obtained by the Two Groups of Farmers

The results presented in tables 4.8 and 4.9 show that majority of farmers using informal sources of credit (67%) applied for loan between N10,000.00-N50,000.00. However, only 33% of this group applied for loan between N60,000.00—N100,000.00. The reason given by the respondents for this is that it is easy and quick to get smaller amount from money-lenders. The average loan application for this group is N47,000.00/respondent, while majority of farmers using formal sources of credit (63%) applied for loan in the range of N100,000.00—N150,000.00. But only 37% of this group of farmers applied for loan of N10,000.00—N100,000.00. The average loan application for this group is N99,000.00/respondent.

Analysis of the amount of credit disbursed shows that majority of farmers using informal sources of credit (76%) got N10,000.00—N50,000.00 from their credit sources as loan, with an average disbursement of N43,000.00/respondent and disbursement percentage of 92 which is given by average amount of credit disbursed divide by average amount applied for as credit (N43,000.00/N47,000.00), while majority of farmers using formal sources of credit

(56%) got N60,000.00—N100,000.00 from their credit sources as loan, with an average disbursement of N66,600.00/respondent and disbursement percentage of 67 which is also given by average amount disbursed divide by average amount applied as loan (N66,600.00/N99,000.00). This revealed that accessibility to credit in the study areas is easier with farmers using in formal sources of credit (92% disbursement) than with farmers using formal sources of credit (67% disbursement). However, in terms of volume of credit supplied by the formal sources supersede the credit supplied by the informal sources in the study areas.

4.2.1 *Statistical test of significance*

The mean amount of loan obtained by the two types of farmers was further put to statistical test to verify if there was significant difference between the amounts of loan received by the two groups of farmers using z-statistic. The result reveals that calculated z-statistic was 11.92, whereas the tabulated z-statistic for the two tailed test at 0.05 level of significance range between -1.96 to +1.96. The calculated (11.92) lies outside the range, hence we reject the null hypothesis and accept the alternative hypothesis which states that there is significant difference between the amount of loan received by tomato farmers using formal sources of credit and amount of loan received by tomato farmers using informal sources of credit.

Table 4.8 Distribution of Respondents according to Amount of Credit Applied for

Amount (Naira)	Informal sources	Formal sources
<50,000.00	44(67)	10(18.5)
50,000.00—100,000.00	22(33)	10(18.5)
>100,000.00	Nil	34(63)
Total	**66(100)**	**54(100)**
	mean=47000.00	**mean=99000.00**

Source: Field Survey, 2009

Figures in parenthesis are percentages

Table 4.9 Distribution of Respondents according to Amount of Credit Obtained

Amount (Naira)	Informal sources*	Formal sources**
<50,000.00	50(76)	19(35)
50,000.00—100,000.00	16(24)	30(56)
>100,000.00	Nil	5(9)
Total	**66(100)**	**54(100)**
	mean=43000.00, SD=9920	**mean=66600.00, SD=10967**

***=Average interest rate applied (40%/annum)**

****=Average interest rate applied (22%/annum)**

Source: Field Survey, 2009

Figures in parenthesis are percentages

4.3 Input-Output Levels in Tomato Production among the Two Groups of Farmers

The inputs used for tomato production in the study areas were land, labour, fertilizers, manure, seed, water, petrol, insecticide/chemicals and irrigation pump. Output is yield of tomato obtained per land cultivated.

4.3.1 *Farm size*

The average size of lands used for tomato production was 1.21ha and1.31ha by farmers using both informal and formal source of credit respectively (Tables 4.10 and 4.11). The maximum land size put into production was 2.0ha for both groups of farmers while the minimum were 0.42 and 0.62 for farmers using informal and formal sources of credit respectively. In the study areas the ownership system is by inheritance and due this reason most of land are fragmented and the fragmentation of land into small units affects productivity because it does not permit optimal use of resources including seeds, fertilizer, chemicals and labour. The inclusion of land or farm size in the study is important because output is a function of farm size (ceteris paribus) and this will translate into determination of the farmer's income and his ability to pay his loan and interest obligation as at when due.

4.3.2 *Labour*

The average labour used in the study areas was 459 and 400 man-hour by the two groups of farmers using informal and formal sources of credit respectively. The maximum labour used by farmers using informal source of credit was 750 man-hour which was greater than maximum labour used (500man-hour) by farmers using formal source of credit, meaning that the farmers using formal sources of credit uses less labour than farmers using informal source of credit and this could be as a result awareness in the use of modern farming technologies by farmers using formal sources of credit. However, the minimum labour was 168 and 300 man-hour for farmers using formal and informal sources of credit respectively. The recommended man-hour per tomato production cycle/ha using 5 men for eight (8) hours in ten (10) operations is 400man-hour (Elizabeth, 2010). The result reveals that labour is overutilised by farmers using informal sources of credit and therefore decreasing the amount of labour for this group will decrease the variable cost and by implication their profit will increase as well as income. The labour used by the farmers using formal sources of credit is on the average 400man-hour per production cycle /ha.

4.3.3 *Seeds*

The seeds used by the farmers in the study areas were either bought from certified seed company, out growers or obtained the seeds from previous year harvest. The maximum and minimum for the farmers using formal source is 0.3 and 0.05 kg while that of farmers using formal source of credit is 0.3 and 0.2 kg. The average quantity of seeds used per hectare was 0.275kg/ha and 0.175kg/ha for the farmers using informal and formal sources of credit respectively (Tables 4.10 and 4.11). Even though the farmers using informal sources of credit uses more seeds than the farmers using formal sources of credit, it is evident from the farmers' responses that the first group used seeds from previous year harvest or buy from other farmers. While the second group in most cases obtain their seeds from certified seed company with assurance of qualitative and viable seeds. The recommended seed rate is 0.35kg/ha (USAID, 2009), meaning that the seed may be underutilised and with other recommended agronomic practices increasing the plant population to the recommended rate will increase output that will translate into increase in profit and income.

4.3.4 *Inorganic Fertilizers*

The maximum and minimum fertilizer used by the two groups of farmers was the same 250kg and 100kg respectively. However, the average fertilizer used was 150 and 155kg for farmers using informal and formal source of credit respectively. The

farmers using formal sources of credit used more fertilizers than the farmers using informal sources of credit and the reason could be as a result of farmers using formal sources of credit having more access to government fertilizer subsidy. The recommended fertilizer application rate per production/ha is 200Kg/ha (Oyinlola, 2005). This resource was underutilised by the two categories of farmers probably due to the hike in price, unavailability and subsidy diversion in the study areas.

4.3.5 *Manure*

The average manure used by the farmers using both informal and formal sources of credit was 3 and 2.9 tonnes per hectare respectively. The minimum were 2 and 1 tonnes/ha and maximum 4 and 5 tonnes/ha respectively (Tables 4.10 and 4.11). From the responses given by the two groups of farmers, this input is mostly sourced from backyard, livestock and metropolitan waste. However the application is far less than the recommended rate of 40 tonnes/ha (Oyinlola, 2005) for optimum yield. This input is also underutilised by the two groups of farmers.

4.3.6 *Chemicals*

The result presented in tables 4.10 and 4.11 show that the average insecticide and herbicide used by the two groups of farmers (informal and informal sources of credit) were 5 and 8 litres/ha respectively. The maximum were 7 and 10 litres/ha while the minimum is 3 and 6 litres/ha for the two groups of farmers respectively.

The usage of insecticide and herbicide is a function of insects, disease and weed incidence.

4.3.7 *Irrigation* w*ater*

This is used for irrigation in the study area. The maximum and minimum used for farmers using formal source was 50000 and 10000 litres respectively while farmers using informal source of credit used maximum of 55000litres and minimum of 10000 litres. The average quantity of water used by both farmers were 32500 and 30000litre per hectare respectively (Table 4.10 and 4.11).The volume of water used was calculated using the formula; (volume of water used=irrigation frequency x time taken to irrigate the plot x flow rate). Where frequency of irrigation was found to be 8, time taken to irrigate 1ha was 31minutes for farmers using formal sources of credit; and 34minutes for farmers using informal sources of credit and the flow rate was found to be 2litre/sec. The usage of this input is above the recommended rate of 5000-7000 litres/tomato production/ha considering other edaphic factors and irrigation frequency (Annandale, 1995), meaning that this resource is also overutilised and grossly inefficient.

4.3.8 *Output*

Tomato output refers to the quantities of tomato harvested from a given area. These were later costed using average market price at harvest during the two

seasons. It was shown that the average quantity of tomatoes harvested by the two groups of farmers (formal and informal sources of credit) per ha were 5750kg and 4750kg respectively. The maximum output for farmers using formal and informal sources of credit were 8500 and 7000 kg/ha while the minimum output were 3000kg and 2500kg/ha respectively. The difference in output between the two classes of farmers might be due to enlightenment and adoption of modern farming technologies. However, the output is far below the potential or recommended yield which is 40tonnes/ha (NAERLS, 1989). This could be due to shortage or inadequate of capital in the study areas which ultimately lead underutilisation of resources.

Statistical test of significance:

The mean output obtained by the two groups of farmers was further put to statistical test to verify if there was significant difference between the outputs obtained by the two groups of tomato farmers using z-statistic. The result reveals that calculated z-statistic was 2.05, whereas the tabulated z-statistic for the two tailed test at 0.05 level of significance range between -1.96 to +1.96. The calculated (2.05) lies outside the range, hence we reject the null hypothesis and accept the alternative hypothesis which states that there is significant difference

between the output obtained by tomato farmers using formal sources of credit and output obtained by tomato farmers using informal sources of credit.

Table 4.10 Input and Output Levels of Tomato Production by Farmers using Informal Sources of Credit

variable	No.	Min.	Max.	Mean	St. dev
Farm size (ha)	66	0.42	2.00	1.21	40
Manure (kg)	66	2000	4000	3000	156
Labour (m/h)	66	168	750	459	98.9
Seed (kg)	66	0.2	0.35	0.275	0.12
Water (lit)	66	10000	55000	32500	22515
Chemicals (lit)	66	3	7	5	14.3
Fertilizer (kg)	66	50	250	150	61.19
Output Kg/ha	66	2500	7000	4750	310.33

Source: Researcher's computation, 2010.

Table 4.11 Input and Output Levels of Tomato Production by Farmers using Formal Sources of Credit

Variable	No.	Min.	Max.	Mean	St. dev

Farm size (ha)	54	0.62	2.00	1.31	42
Manure (kg)	54	1000	5000	3000	195
Labour (m/h)	54	300	500	400	76.78
Seed (kg)	54	0.05	0.30	0.175	0
Water (lit)	54	10000	50000	30000	13333.33
Chemicals (lit)	54	6	10	8	14.1
Fertilizer (kg)	54	100	250	155	59.86
Output	54	3000	8500	5750	377.09

Source: Researcher's computation, 2010.

4.4 Result of production function analysis (Regression)

In order to determine the nature of the technical relationship between inputs and outputs, multiple regression models using ordinary least square (OLS) were used. Different functional forms were fitted to the input-output data. However, Cobb-Douglas (double log) production function was selected as lead equation or line of best fit. This was based on the magnitude of the coefficient of multiple determination (R^2), the appropriateness of the signs of the estimate, significance of the t-values, standard errors and over all significance of the f-value which determines the strength of association between the dependent and independent variables. According to Koutsoyiannis (1977), the smaller the standard error, the stronger is the evidence that estimates are statistically significant. He further

affirmed that if, the observed t-value is greater than 2 (or smaller than -2), then we reject the null hypothesis and if, on the other hand, the observed t-value is smaller the 2 (but greater than -2), we accept the null hypothesis.

The results of the Cobb-Douglas function of the farmers using informal and formal source of credit presented in Table 4.3 shows that R^2 value which measures the proportion of the variation in dependent variable Y that is explained by the independent variables were 55% and 75%, while R^2-adjusted were 50% and 60% for the farmers using informal and formal sources of credit respectively. The F-values were 53 and 70 at 5% level of significance for farmers using formal and informal sources of credit respectively and this implies that the independent variables included in the model were all important in explaining the variations in the dependent variables for the two groups of farmers. It also shows regression coefficient (bi) which is a good estimate of individual elasticities of independent variables, standard error and T-values for farmers using the two sources of credit as indicated in Table 4.12.

4.4.1 *Farm size (x_1)*

Farm size was 0.486 positive and significant at 10% level of probability for farmers using informal sources of credit, meaning that an increase in farm size for this group of farmers by one unit will bring about an increase in yield performance

by 0.49 unit/ha. However, for farmers using formal source farm size is positive but not significant.

4.4.2 *Fertilizer (x_2)*

There was a priori expectation for this input to be positive and significant in the model but it only turned out to positive but not significant for the two groups.

4.4.3 *Manure (x_3)*

Manure was 0.471positive and significant at 10% level of probability for farmers using informal source, meaning that an increase in manure for this group of farmers by one unit will bring about an increase in yield of tomato by 0.47 unit/ha. For farmers using formal source the result is 0.42 negative at 5% level of significance ($p \leq 0.05$). However, the sign of manure for this group of farmers did not comply with a priori expectation but it is still statistically significant.

4.4.4 *Labour (x_4)*

For farmers using informal source of credit this is 0.25 negative and significant at 10% level of probability ($P \leq 0.1$), meaning that decrease of labour by one unit will bring about an increase in tomato yield by 0.25 unit/ha. This resource is overutilised. However for farmers using formal sources of credit labour is 0.26 positive at 5% level of significance, i.e. an increase in labour by one unit will bring 0.26 unit increase in tomato yield/ha.

4.4.5 *Seeds (x_5)*

For farmers using informal source of credit the use of seeds is 0.72 positive and significant at 10% level of probability (P≤0.01), meaning an increase of seeds by one unit will bring about increase in tomato yield by 0.72 unit/ha. However, for farmer using formal sources of credit it is 0.35 positive at 10% level significance i.e. 1 unit increase in the quantity of seeds will bring about 0.35 increase of tomato yield/ha.

4.4.6 *Irrigation water (x_6)*

The regression coefficient of irrigation water for farmers using informal sources of credit is 0.40 and negative at 10% level of significance. However, for farmers using formal source of credit the regression coefficient 0.21 negative at 5% level of significance (P≤0.05), meaning that irrigation water is underutilsed for the two groups.

4.4.7 *Chemicals(x_7)*

For farmers using informal source of credit this variable is positive and significant at 10% level of probability (P≤0.10). Meaning that 1 unit increase in insecticide will result in increase of the yield of tomato0.23 unit/ha. The result of formal source of credit group showed a regression coefficient of 0.42 positive at 5% level

of significance (P≤0.05), meaning one unit increase in the use of chemicals will result in an increase of tomato yield by 0.42 unit/ha.

Table 4.12 Estimated regression coefficients, standard error and t-value for the two groups of tomato farmers.

Variables	Reg. Coeff.(bi)		Standard error		t-value	
	Informal	Formal	Informal	Formal	Informal	Formal
Constant (a)	3.453	2.858	0.477	0.804	7.239	3.555
Farm (X_1)	0.486*	0.101	0.160	0.121	3.040	0.838
Fertilizer (X_2)	0.192	0.273	0.226	0.166	0.848	1.644
Manure (X_3)	0.471 *	-0.418**	0.229	0.137	2.059	-3.039
Labour (X_4)	-0.249*	0.263**	0.137	0.060	-1.815	4.383
Seeds (X_5)	0.720*	0.348*	0.124	0.095	5.792	3.663
Water (X_6)	-0.444*	- 0.311**	0.209	0.164	-2.121	-1.897
Pesticide (X_7)	0.230*	0.421**	0.107	0.115	2.155	3.661

Informal source:

R^2 = 55%

R^2adj =50%

F-value = 53**

Formal source:

R^2 =75%

R^2adj = 60%

F-value = 70**

* Significant at 10%

** Significant at 5%

Source: Shazam regression analysis software.

4.4.8 *Marginal productivity, resource use efficiency and elasticity of production*

The results presented in Tables 4.13 and 4.14 show the marginal productivity, efficiency of resources-used of tomato production for the two groups of farmers in the study areas. It was observed that all the variable inputs except labour, petrol and irrigation water (-3.5, -11.28 and -6.33) have efficiency ratio greater than unity for the farmers using of informal sources of credit, i.e. labour and irrigation water were overutilsed by this group of farmers. However, water, petrol and manure were observed to be overutilised (-7.5, -11.52 and-10.18) by farmers using formal sources of credit but other resources used by this group have efficiency greater than unity, meaning that most of the inputs or resources were underutilized in the production of tomato by the two group of farmers. This may be due to high costs and unavailability related to some of these inputs in the study areas.

Table 4.13 Marginal productivity and resource use efficiency for farmers using informal source of credit

Variable inputs	X	MPP	MVP	UFC	MVP/UFC
Farm size (ha)	1.21	2309	115475.21	5000	23.09
Manure (kg)	3000	0.904	45.176	2	22.59
Fertilizer (kg)	150	0.73	36.72	80	0.46
Labour (mn-hr)	459	-3.119	-155.96	110	-1.417
Seeds (kg)	0.12	34507	415000	22500	16.6
Water (lit)	32500	-0.0785	-3.933	0.225	-17.48
Chemicals (lit)	5	265.42	2604	1100	2.36

Source: Researcher's computation, 2010.

Table 4.14 Marginal productivity and resource use efficiency for Farmer using formal Source of Credit

Variable	X	MPP	MVP	UFC	MVP/UFC
Farm size (ha)	1.3	435.66	21783	5000	4.36
Manure (kg)	3000	-0.8002	-20.35	2	-10.18
Fertilizer (kg)	175	4.09	204.5	80	2.56
Labour (mn-hr)	345	3.85	192.75	110	1.922
Seeds (kg)	0.175	4293	214650	22500	10.73
Water (lit)	30000	-0.05954	-1.7	0.225	-7.5
Chemicals (lit)	8	79.36	3968	1000	3.97

Source: Researcher's computation, 2010.

The results presented in tables 4.15 and 4.16 show the sum of the elasticities of input variables for tomato farmers using informal and formal source of credit which represent estimates of regression coefficient were found out to be 1.406 and 0.677 respectively. These were observed to be greater than unity for farmers using informal sources of credit and it implies an increasing return to scale for this groups of farmers, meaning an increase in all the inputs in the model by one unit will result to an increase in the output of tomato by greater amount (1.406), i.e. the

farmers in this group are operating in stage one (1) of production process. However, the sum of elasticities were observed to be less than unity for farmers using formal sources of credit and it means a decreasing return to scale for this group of farmers and implies that an increase in all the inputs in the model by one unit will result to an increase in the output of tomato by lesser amount (0.677), i.e. the farmers in this group were operating within stage two of the production process. There is need for resources adjustment in the two groups of farmers, labour and water need to be reduced and all other resources need to be increase for farmers using informal sources of credit; only water needs to be reduced while other resources need to be increased for farmers using formal sources of credit.

The need for resource increase may result in sourcing of more capital in form of informal and formal credit which will be used by the two groups of farmers in order to attain a reasonable increase in tomato output.

Table 4.15 Sum of elasticities of input variables for farmers using informal sources of credit (return to scale)

Variable	Elasticity(Ep)=bi
Farm size(ha)	0.486
Fertilizer (kg)	0.192
Manure(kg)	0.471
Labour(man-hour)	-0.249
Seeds (kg)	0.720

Water(litre)	-0.444
Chemicals(litre)	0.230
∑Ep	**= 1.406**

Source: Regression result, 2010.

Table 4.16 sum of elasticities of input variables for farmers using formal sources of credit (return to scale) .

Variable	**Elasticity(Ep)=bi**
Farm size(ha)	0.101
Fertilizer (kg)	0.273
Manure (kg)	-0.418
Labour(man-hr)	0.263
Seeds (kg)	0.348
Water(litre)	-0.311
Chemicals(litre)	0.421
∑Ep	**= 0.677**

Source: Regression result, 2010.

4.5 Analysis of costs and returns to tomato production by the two groups of farmers

In order to achieve objective iv of the study, net farm income was used to determine the profitability of tomato farmers using formal and informal sources of credit. The prevailing market prices of inputs and output at the time of data

collection were used in calculating costs of production and returns. In determining the profitability of an enterprise, the return must be higher than the total costs incurred if the business is to remain solvent.

4.5.1 *Cost of production*

In estimating the costs of production, both fixed and variable costs were considered. The fixed costs consist of land rent, depreciation on water pumps, basket, hoes, farm implement and interest on capital. The variable cost components consist of cost of seeds, labour, fertilizers, manure, chemicals, petrol and water (Table 4.17). The total cost of production in the case of informal source of credit is higher (N143,271.00) than the formal source of credit (N115,058.00) and this is might be as a result of higher cost of labour, interest on borrowed loan and cost of seeds. During the course of research it was gathered that most farmers using informal source got seeds from local source which is relatively more costly (because more plant density is needed as not all seedling are viable), therefore this group of farmers ended up in buying more seeds while farmers using formal source got their seeds from certified seed companies which is relatively cheaper and more viable; the cost of capital is also higher (N39,910.00 per every N100,000.00) in the case of informal source of credit (40%p.a.) as against formal source of credit (N21,700.00 per every N100,000.00 i.e. 22%p.a.) and most labour used by farmers

using informal source is manual (family and hired) while the farmers using formal source used mixture of manual and mechanised (in cases like harrowing and herbicide applications), therefore the average labour of informal sources tend to cost more (N50,160.00/ha) as against N37,950.00/ha in the case of formal sources in the study areas.

Total variable cost:

The total variable costs of tomato farmers using informal and formal sources of credit were cost of seed, Manure, fertilizers, Chemicals, Petrol, labour and water irrigation. Average variable cost per hectare of N130401.00 and N101858.00 were incurred on tomato production by farmers using informal and formal sources of credit respectively. This accounted for 91% and 89% of the average total cost for tomato production by the two group of farmers respectively (Table 4.17).The result obtained is similar to the findings by Sintiki (1990), who concluded that the variable costs constituted 90% of the total cost of production. The result further revealed that labour constitutes 39% and 37% of the total variable costs; 35% and 33% of the total costs for farmers using formal and informal sources of credit

respectively. This indicates that labour is the most used input followed by interest on loan among the two groups of farmers, meaning that the cost of labour and interest constitute about 70% of the variable cost for the two group of farmers. However, the total variable costs of farmers using informal sources of credit is higher than that of farmers using formal sources of credit due to the probably the following reasons: (i) farmers using informal sources of credit in most cases use seeds from previous year's harvest and other farmers which tend to genetically degenerate and become less viable; this group of farmers therefore ended up buying more seeds for replanting while farmers using formal sources of credit use certified seeds from seed companies that are more viable and therefore spend less; (ii) farmers using informal sources of credit spend extra amount on manual labour while farmers using formal sources of credit use labour saving device such herbicide application; (iii) the inputs used by farmers using informal sources of credit cost more because of higher loan interest (40% on the average) while the inputs used by farmers using formal sources of credit relatively cost less because of lower interest on loan (22% on the average). The result further indicates that monetised variable inputs have assumed greater importance in the production process of small farmer with the adoption of new farming technologies, hence the need for sources of capital in form of loan to undertake tomato production.

Total fixed cost:

The total fixed cost consists of land rent, depreciation on water pump, baskets, hoes and implements. The average fixed costs for the two groups of farmers was N13200.00 in each case. This represents 9% and 11% of the total cost of tomato production per hectare (Table 4.17). The two groups of farmers have the same fixed costs.

4.5.2 *Gross return*

Gross return was obtained by multiplying the total output of tomato by the unit price. Average price of tomato per kilogram in the study areas was determine by taking prices between February-May and October-December 2009 and was found to be ₦ 40.00. The result shows that the average returns on tomato production in the study areas by farmers informal and formal source of credit) were N190,000.00 and N230,000.00 respectively. The result indicated a difference of N40,000.00 translating into 21% increase in gross return for the farmers using formal sources of credit and this may be as a result of this group of farmers using improved seed variety, better farming techniques and loan of low interest rate regime.

4.5.3 *Net farm income and average rate of return*

This represents the difference between the value of output and total cost. The result revealed that an average net farm income of N46,399.00 and N114,942.00

per hectare accrued to tomato farmers using informal and formal source of credit respectively. The result further showed that tomato production is profitable in the study areas. However the net farm income for farmers using formal source of credit was higher than the net farm income for farmers using informal source of credit for the reasons stated in 4.5.1 and 4.5.2 above. The average rate of return analysis showed 32% for informal sources of credit and 100% for the formal sources of credit i.e. for every naira invested by farmers using informal source 32k is generated as revenue while a naira invested by farmers using formal source 100k (N1) is generated as revenue (Table 4.17), meaning that, tomato farming is more profitable using formal sources of credit than using informal sources of credit.

Statistical test of significance:

The mean profit or net farm income realized by the two groups of tomato farmers was further put to statistical test to verify if there was significant difference between the profit realised by farmers using formal sources of credit and profit realised by farmers using informal sources of credit by using z-statistic. The result reveals that calculated z-statistic was 30, whereas the tabulated z-statistic for the two tailed test at 0.05 level of significance range between -1.96 to +1.96. The calculated (30) lies outside the range, hence we reject the null hypothesis and accept the alternative hypothesis which states that there is significant difference

between the profit realised by tomato farmers using formal sources of credit and profit realised by tomato farmers using informal sources of credit.

Table 4.17 Quantity of variable inputs used by the two groups and their unit prices

Input	Unit price (N)	Qnty used (formal)	Qnty used (informal)
Seed (kg)	22500	0.175	0.275
Manure (kg)	2	3000	3000
Labour (mn-hr)	110	345	459
Water (litres)	0.225	30000	32500
Fertilizer (kg)	80	175	150
Chemicals (litres)	1050	8	5

Petrol (litres)	65	48	50

Source: Researcher's computation, 2010.

Table 4.18 Costs, Returns and NFI of Tomato Production by the Groups of Farmers per Hectare

	Informal source	Formal source
	Cost in Naira	Cost in Naira
Variable inputs		
Seeds (kg/ha)	6188.00	3938.00
Manure (kg/ha)	6000.00	6000.00
Labour (man-hour/ha)	50490.00	37950.00
Irrigation water (litres/ha)	7313.00	6750.00
Petrol (litres/ha)	3250.00	3120.00
Interest on loan/year/ha	39910.00	21700.00
Fertilizer (kg/ha)	12000.00	14000.00
Chemicals (litres/ha)	5250.00	8400.00
Total variable costs (A)	**130401.00**	**101858.00**
Fixed inputs:		
Irrigation pump*	8000.00	8000.00
Hoe *	100.00	100.00
Basket *	100.00	100.00
Land rent**	5000.00	5000.00
Total fixed costs (B)	**13200.00**	**13200.00**
Total cost (A+B) =C	**143601.00**	**115058.00**
Revenue* (D)**	**190000.00**	**230000.00**
Net farm income (D-C)	**46399.00**	**114942.00**
Average rate of return (NFI/TC)	**0.32**	**1.00**

***Revenue is calculated on the basis of average price of N40/kg taken between February-May and October- December 2009.**

****Per annum**

*** @ 33.33% Dep/annum. Source: Researcher's computation, 2010.**

4.6 Constraints Affecting the Delivery of Formal and Informal Credit in the Study Areas

The result presented in table 4.19 shows the major constraints affecting the delivery of agricultural credit in the study areas. High interest rate (45%) was ranked first among the problem facing farmers using informal source of credit while insufficient amount was ranked second (29%). Late disbursement of credit was ranked last. Only 6% of the farmers reported this as a constraint among farmers using informal source of credit. This implies that the major problem among farmer using informal source of credit was high interest rate. This may be attributed to informal nature of credit available to them. On the other hand late disbursement of credit was ranked first (30%) among farmers using formal source of credit while lack of extension services was ranked last (10%). However, insufficient amount is ranked 2nd in both group of farmers, this may be due risky nature of agricultural investment and the government and financial institution unwillingness to assist the sector in terms of credit timely disbursement.

Table 4.19 Constraints Affecting the Delivery and Proper Utilization of Informal and Formal Credit in the Study Areas

Constraints	Frequency		Rank	
	Informal	Formal	Informal	Formal
High Interest rate	30 (45)	11 (20)	First	Third
Late disbursement	4 (6)	16 (30)	Fifth	First
Insufficient amt	19 (29)	14 (25)	Second	Second
Lack of ready mkt.	6 (9)	8 (15)	Fourth	Fourth
Lack of ext. services	7 (11)	5 (10)	Third	Fifth
Total	**66 (100)**	**54 (100)**		

Source: Field Survey, 2009

Figures in parenthesis are percentages

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The research was carried out in Kano in 2009/2010 farming season and was set out to compare and analyze capital and its effects on tomato production by farmers using formal and informal sources of agricultural credit in the study areas. Primary data was collected during 2009/2010 dry and rainy season from a total sample of 120 farmers (66 from farmers using informal sources of credit and 54 from farmers using formal sources of credit) who were purposively selected. The data was analyzed using descriptive statistics such as mean, maximum score ranking, percentage farm budgeting and production function analysis.

The result showed that majority of the respondents were within the age group of 21-40 years. Most of the two categories of farmers had only primary and secondary education. The result also showed that about 70.5% of farmers in the two groups cultivate less than 1.5ha. The analysis of the result further revealed that farmers in the study areas practice both dry season and rain-feed tomato farming. Majority of

the farmers using informal sources of credit (67%) applied for credit between N10,000.00—N50,000.00 with average of N47,000.00/applicant, while majority of farmers using formal sources of credit (63%) applied for credit between N10,000.00—N100,000.00 with average of N99,000.00/applicant. However, 76% of the farmers using informal source of credit were disbursed between N10,000.00—N50,000.00 with average disbursement of N43,000.00/applicant while only 56% of the farmers using formal sources of credit were disbursed N60,000.00—N1000,000.00 with average disbursement of N66,600.00/applicant.

From the regression results, farm size, seeds and chemicals were positive and significant while water and labour were negative and significant for farmers using informal sources of credit. However, labour, chemicals and seeds were positive and significant while water, petrol and manure were negative and significant for farmers using formal sources of credit. The result of marginal productivity and resource use efficiency calculation showed that most variable inputs have efficiency ratio greater than unity (resources are underutilized). The sums of elasticities for the two groups of farmers (formal and informal) are 0.677 and 1.406 respectively, indicating that yield can be increased if most of the resources used in the production are adjusted or increased.

The result of Net farm income (NFI) and Average rate of return (ARR) indicated that tomato production by both group of farmers is profitable.

The ranking of constraints affecting the delivery of both type of credits (formal and informal) in the study areas showed that interest rate is as a constraint is ranked first for farmers using informal source of credit while late disbursement of loan as a constraints is rank first for farmers using formal source of credit. The second constraint for the two groups of farmers is insufficient amount of money disbursed. However, high interest rate is 3rd constraint for Farmers using formal sources of credit while late disbursement 3rd constraints for farmers using informal source of credit. Lack of markets during glut and extension services are among the constraints mentioned by the two classes of farmers.

5.2 Conclusions

Based on the findings of this study, it is concluded that the two categories of farmers are in there middle ages and that there is relatively small gap between credit requested and credit obtained by the farmers who used informal sources of credit, while the gap was found to be relatively large among farmers who used formal sources of credit. Similarly, it was found out that most of inputs resources used by the two groups of farmers were underutilsed due insufficient credit. It was

also apparent from the findings that tomato production by the two groups of farmers within the limited resources is profitable, but it is more profitable among farmers who used formal sources of credit (average rate of return of 100%) than farmers who used informal sources of credit (average rate of return of 33%). High interest rate and insufficient amount of credit received are among the major constraints that hamper access to credit by farmers using informal sources of credit, while late disbursement and insufficient amount loan received are among the major constraints that hamper access to credit by farmers using formal sources of credit. The output and ultimately profit would have been higher if the problems highlighted by the farmers are addressed and farmers make optimum utilization of the resources by having access to agricultural credit at lower interest rate.

5.3 Recommendations

1. From the result of the study, the interests charged by the two sources are on the high side. It is therefore recommended that effort should be made by the government and agencies concerned to have a concessional interest rate to a single digit for farmers using formal sources of credit. For farmers using informal sources rotational saving (adashi or esusu) which is interest free

should be encouraged in order to deemphasize borrowing from money lenders at exorbitant interest rate.

2. The amount of loan obtained is far less than the requested amount from the formal sources. This might have made some of the farmers who use this source to cut down input use thereby causing resource underutilization. It is that recommended that farmers through the intervention of Central Bank of Nigeria (CBN) in conjunction with commercial and development banks be given enough loan they requested at the right time in order to meet their timely cost of production.
3. One of the constraints reported by the farmers is inadequate extension education on the use of modern farming methods. It is therefore recommended that Government and Non-governmental organizations should endeavour to train more extension workers and post them to the rural areas to carry out extension work particularly on new tomato variety, efficient input utilization and organization of farmers into cooperatives in order to have easy access of loan from formal credit sources.
4. Another constraint also reported by the farmers is inaccessibility to markets and tomato being a highly perishable crop a lot of which will rot away particularly during harvesting period when the supply is greater the demand. It is also

recommended that modern markets and small scale processing outfit should be established by private individuals (through Government intervention) in the tomato producing areas in order to reduce loses.

5. It is also recommended that tomato farmers in the study areas should form a cooperative societies in order to address some of the problems they encounter during production and marketing of their tomato.

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APPENDIX I

QUESTIONNAIRE ON COMPARATIVE ANALYSIS OF TOMATO PRODUCTION AMONG FARMERS USING INFORMAL AND FORMAL CREDIT SOURCES IN THREE LOCAL GOVERNMENT AREAS OF KANO STATE

FARMERS' QUESTIONNAIRE

Dear Tomato Farmer,

Information sourced for this study is to enable the researcher carryout economic analysis of tomato production among farmers using formal and informal credit sources in three local government areas of Kano State (i.e. Rano, Gaya, and Dambatta) as a prerequisite for award of M.Sc. in Agricultural Economics by Ahmadu Bello University Zaria. All information given remains confidential

Instruction: Please tick or fill in the blank spaces as applicable

Questionnaire No:. _____

Date: _____

Farmer's Name: _____

Village: _____ LGA: _____

Section A: Socio-economic Characteristics of Farmer

1. Sex: Male ( ) Female ( )

2. Age: ( )

3. Marital Status: Married ( ) Single ( )

4. Level of Education: Primary ( ) Secondary ( )

   Adult Education ( ) others Specify _____

5. Household size

   a. Working Adult (Male No._____ Female No._____)

   b. Working Children (Male No._____ Female No._____)

   c. Non Working Adult (Male No._____ Female No._____)

   d. Non Working Children (Male No._____ Female No._____)

6. Faring Experience:

   a. How many years did you spend in farming? ( )

   b. How many years did you spend in growing tomato?( )

   c. Do you grow tomato?

      i. Solely ( ) ii. In mixture ( )

   d. Are you engaged in

      i. Dry season farming ( ) ii. Rain-fed farming ( )

      iii. Both ( )

7. Credit experience

   a. Have you ever use credit in your farming activities?

Yes ( ) No ( )

b. What type of credit?

i. Formal ( ) ii. Informal ( )

c. If (i) at what interest _____

d. If (ii) at what interest_____

e. How much money did you borrow for farming last season _____

f. How much of it did you lose spend on

i. Land _____ ii. Labour _____ iii. input _____

8. How many plot do you have?

S/NO.	FIELD NUMBER	SIZE (HA)
1.		
2.		
3.		
4.		
5.		

9. Mode of land acquisition

Hired ( ) cost per ha/annum

Inherited ( ) purchase cost per ha Borrowed ( )

10. What other economic activity are you engage in apart from farming?

Trading ( ) Tailoring ( ) Building ( )

Section B: Information on Credit

11. How did you learn about agric credit? Extension agent ( )

Radio ( ) Television ( ) Field days ( )

Friends and neighbours ( ) Others _____

12. Which type of credit have ever collected? Commercial bank ( )

NACRDB ( ) COOPS ( ) Money lenders ( ) Friends and relatives ( )

13. What problems do you encounter in obtaining the credit? High interest rate ( ) Late disbursement ( ) Insufficient amount ( )

Others_____

Section c: Information on Tomato Production

14. What variety do you grow in your farm?

a. In dry season _____ b. in wet season

15. Cropping pattern

Field No.	**Field Size (ha)**	**No. of Crops**	**Name of Crop grown**

Section D: Input Utilisation

16. Seeds

Name of Crop(s)	Qty. of farmers own seed Kg/ha	Qty. Purchased seed Kg/ha

Price: seed purchase (kg) N_____

Seed from last year harvest N_____

17. Fertilisers

Field No.	**NPK (50kg/ha)**	**Others (50kg/ha**	**Manure (kg/ha)**

Price

NPK (50kg) N_____

Others (Kg) N_____

Manure (Kg) N_____

Manure (kg) generated from household

18. Labour (General)

	Family			**Hired**			
	Men	Children	Women	Men	Children	Women	Total Mondays

Cost of man-hours of labour _____

19. Irrigation Pump:

Field No.	**No. of irrigation pump**	**Unit price**	**Dep. Per season**

20. Water

Irrigation water used (ltrs)	**Field No.**	**Unit price per Litre**

21.Type of Loan

Amount given	**Amount use in farming**	**Interest rate**

22. Miscellaneous expenses N_____

Section E: Output Information

Field No.	**Crops**	**Yield kg/ha**	**Price/kg**

23. Where most do you encounter problems in the course of your farming? Input acquisition ( ) cost of labour ( )

Land acquisition ( ) Loan acquisition ( )

interest rate ( ) marketing of produce ( ) Transportation of Produce ( )

24. Crop purchased during the year

CROPS QTY. BOUGHT	PRICE/KG

Thanks for your cooperation and time.

APPENDIX II

QUESTIONNAIRE ON COMPARATIVE ANALYSIS OF TOMATO PRODUCTION AMONG FARMERS USING INFORMAL AND FORMAL CREDIT SOURCES IN THREE LOCAL GOVERNMENT AREAS OF KANO STATE

INSTITUTIONAL QUESTIONNAIRE

Dear Manager,

Information sourced for this study is to enable the researcher carryout comparative analysis of tomato production among farmers using informal and formal credit sources in three local government areas of Kano State (i.e. Rano, Gaya, and Dambatta) as a prerequisite for award of M.Sc. in Agricultural Economics by Ahmadu Bello University Zaria. All information given remains confidential.

Instruction: Please tick or fill in the blank spaces as applicable

Questionnaire No:. _____

Date: _____

Name of the institution or bank: _____Date.....

Village: _____ LGA: _____

1. What are the criteria se t out by your by institution for granting agric. Loan?

i.....

ii.....

iii.....

iv.....v.....
.....

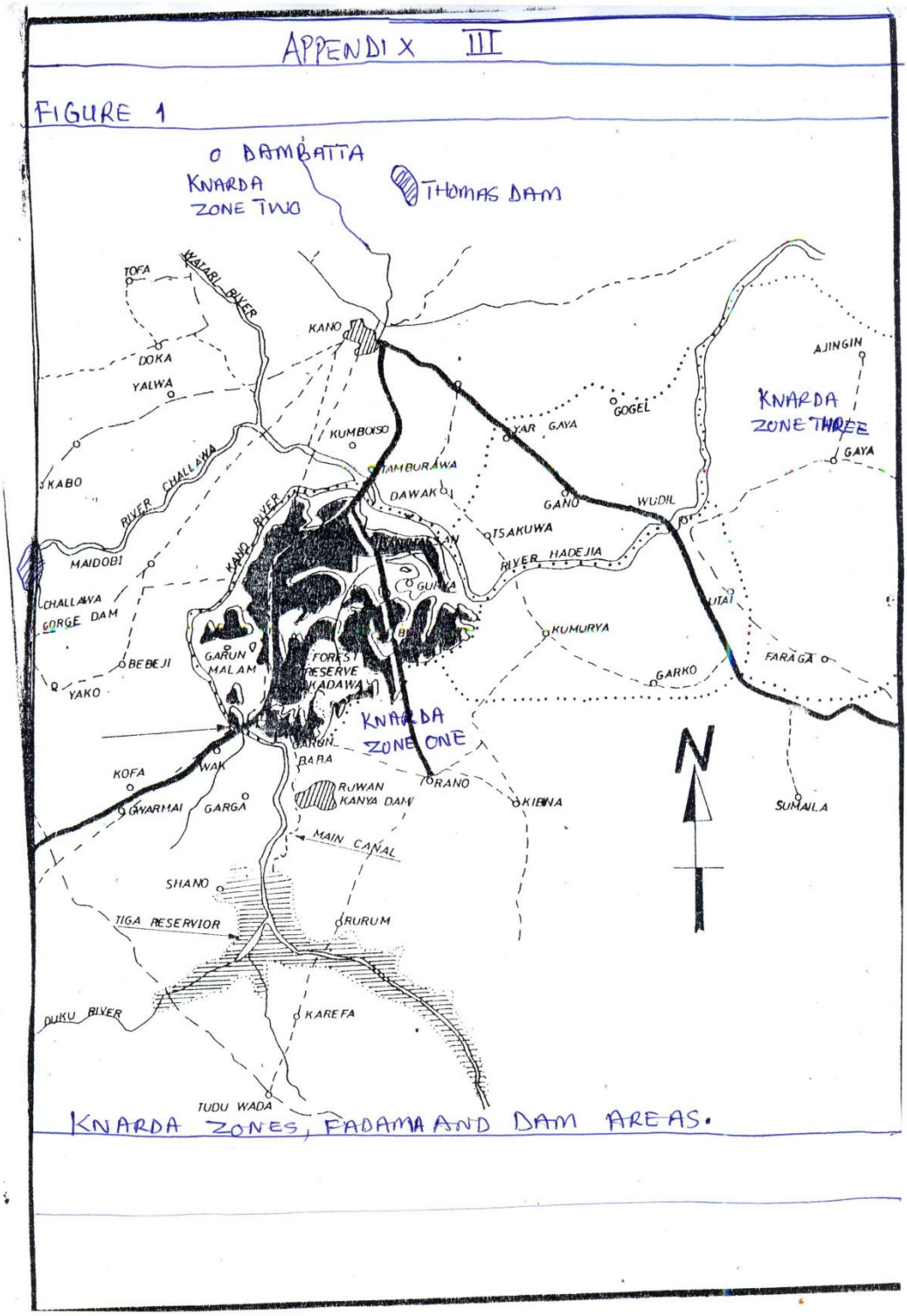
vi.....

2. How many tomato farmers apply for agric loan in your institution?.....
3. What is the range of the amount they apply?..N.....N.....
4. How many tomato farmers receive the loan?.....
5. What is the range of the amount received by the tomato farmers?.....N.....N.....
6. What interest rate is applicable to your institution as at the time of loan disbursement?.....

Thanks for your cooperation and time.

APPENDIX III

FIGURE 1



KNARDA ZONES, FADAMA AND DAM AREAS.

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