USMANU DANFODIYO UNIVERSITY, SOKOTO
(POSTGRADUATE SCHOOL)

ANALYSIS OF VALUE ADDING ACTIVITIES ALONG TOMATO (Solanum lycopersicum L) VALUE CHAIN IN SELECTED LOCAL GOVERNMENT AREAS OF ZAMFARA STATE, NIGERIA

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DEDICATION

This work is dedicate to my Late farther Alhaji Zakariyyau Muhammad and my Late mother Zainab Abu Abubakar

CERTIFICATION

This Thesis by Yusuf **Mohammad** (Adm. No. 11410602120) has met the requirements for the award of the Degree of Doctor of Philosophy in Agricultural Economics of the Usmanu Danfodoyo University, Sokoto and is approved for its contribution to knowledge.

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Contents

Tables	LIST OF TABLES	PAGE

LIST OF FIGURES

ABSTRACT

This study determined the economic potentials of value addition on tomato in Zamfara state Nigeria. A total of 438 tomato value chain actors comprising 134 tomato farmers, 66 input suppliers, 72 tomato processors, 52 wholesalers and 114 tomato retailers were randomly selected from six purposively selected local governments areas for the study. The selection was informed by the intensity tomato production and marketing activities in the study areas. Data were collected using questionnaire and analyzed using descriptive statistics; Value added model, Multiple Regression analysis and Logistic regression. Results revealed that tomato farmers used improved technologies. Majority of the processors sun dried tomato. The value chain actors added a total value of ₦ 58,140 per hectare, ₦ 61,950.67 per month, ₦ 52,394 per ton, ₦4,967 per ton and ₦ 7,200.76 per ton by farmers, Input suppliers, Processors, Wholesalers and Retailers, respectively. The results of ANOVA revealed that there are significant ($p<0.000$) differences between the values added by the actors throughout the value chain. The result of regression analysis indicated that Age, Land size, Labour, Household, Level of education, Experience, Quantity of fertilizer, Access to market and Quantity handled significantly ($p<0.085$, $p<0.000$, $p<0.012$, $p<0.000$, $p<0.04100p<0.012$, $p<0.089$, $p<0.001$ and $p<0.000$) influenced value addition on tomato by farmers. Results of logit regression revealed that access to: extension service, market information and membership of cooperative society significantly influenced ($p<0.011$, $p<0.074$ and $p<0.004$) farmers' decision on value addition on tomato. Results on the level of linkage reveal weak linkage between tomato farmers and other value chain actors. Problems associated with the value chain were cost of input, tomato perishabilty, transportation system, poor storage system and inadequate support by the government. The study concluded that tomato value chain activities in the study area ware dominated by middle aged, male and experienced actors' majority of who were married with large household. The chain consisted of four levels. Though value is added throughout the chain, yet there is need to improve the existing methods for more sustainable value chain in the area. The study recommended that the value chain actors should emphasize on establishing indigenous agro-input firms, encourage development of communities based seed production and distribution centers to ease agro-inputs supply, improved tomato processing technologies should be made available and/or improvise locally and accessible to value chain actors and in collaboration with all stakeholders along the value chain the cooperative societies should encourage their members to participate in all agricultural development programs with a view to improving the value chain actors' socio-economic status in the study area.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Tomato (Solanum lycopersicum L) is one of the most important vegetable crops in Nigeria. It is known to be very important for both nutritional and industrial purposes. Tomato is one of the world's most popular vegetable crops and is an important food component consumed in Nigeria. It serves as source of income to actors along the value chain, right from the farms' gate through to the final consumers (Orefi *et al.*, 2011). Musa and Choji (2009) reported that tomato is a major cash crop for small farmers and a potential source of rural employment in most developing countries. Tomato has become an important cash and industrial crop in many parts of the world. In Nigeria, an annual total area of 1million hectares is used for its cultivation, producing 1.701 million tonnes of tomato annually while it contributes about 18% of the average daily vegetables consumption in Nigerian homes (Chidi, 2012).

Tomato is a highly perishable vegetable crop; its perishability makes its storage and supply difficult. The quality and nutritional value of fresh produce like tomato is affected by post-harvest handling and storage conditions. Tomato is not only a seasonal crop but highly perishable and deteriorate very fast immediately after harvest, losing almost all it's required quality attributes and some could likely result to total waste. At least, up to 50% of this produce is lost between rural production and town consumption in the tropical area (Babalola *et al.,* 2010). The continual losses of perishable produce due to lack of storage facilities usually leads to persistent increases in their prices. This means that when it is in season, the price is relatively low but shortly after the harvesting season,

the prices shoot up and this is made worse by the inability of the actors to add value to the surplus usually harvested (Chidi, 2012).

For a nation that wants to develop, it must focuses on area where it has comparative advantage and surely Nigeria does has a comparative advantage in the agricultural sector especially in tomatoes production and processing. Nigeria produces about 1.701 metric tonn of tomato per year but over 50% of this value is lost mostly through poor storage system and bad road network thereby leading to lack of availability of the product during certain period of the year and also making it expensive. The above loophole makes tomato processing a viable business in Nigeria. The demand for tomato and its bye-product far outweighs the supply. With a population of over 140 million people and an estimated national population growth rate of 5.7% per annum ,an average economic growth rate of 3.5% per annum in the past five {5} years, Nigeria has a large market for processed tomato product. Also the investor can also take advantage of the trade liberalization in the West African {ECOWAS} market to sale there product (Olaniyan et al., 2007).

In Nigeria, less attention is given to value addition on agricultural commodities even though it is the most needed vector of agricultural development in the country. For Nigeria to enhance its economic growth, the nation seriously requires value addition on its agricultural commodities, which involves taking the product to the next level before sale, adding an extra value to the fresh product, an extra level of sophistication which can involve industrial processing, packaging or some innovative marketing strategy (Obasi, 2012).

Value-addition is simply the act of adding value to a product, whether you have grown the product or not. It involves taking any product from one level to the next. For farmers, value-addition has a particular relevance in that it aids transforming a less profitable enterprise into a more profitable one. In fact, there are few enterprises that a small scale farmer can produce and sell with reasonable profit at the first level. Therefore, a value-addition strategy is critical to the long-term survival of most small farms. Value addition chain includes all the economic advancements on a product as a result of developmental activities on the produce by the actors as it passes along the value chain till it reaches the final consumer. Thus, value chain activities do not only have the effect of increasing the quantity, quality and value of locally produced tomato but also have the ability of expanding the customer base of it products and creation of the most needed job opportunities, (Kent, 2004). Zamfara is one of the tomato producing states in northern Nigeria. It is in view of this, that the study determined the economic potentials of value addition in tomato value chain in selected local government areas of Zamfara State.

1.2 Statement of the Research Problem

Nigeria is blessed with abundant natural resources which include abundant land suitable for several types of agricultural production. Vegetable crops such as tomato and pepper are some of the crops grown in Nigeria. In fact, Nigeria is one of the major producers of tomato in Africa (Musa and Choji, 2009).

Unfortunately, the output of tomato farming in Nigeria has not been able to march the local demand for the highly perishable commodity and as such it is unable to stop the country from the importation of canned tomato. In 2012, Nigeria imported 69,809 tons of canned tomato valued at N1.7 billion (Chidi, 2012). This may be attributable to Nigeria's

rapidly increasing population (182 million people with a growth rate of 5.7% per annum and the perishable nature of the commodity and tomato glut due to the absence and or presence of poor value addition activities on tomato (Aworh, 2011)

However, tomato importation is never a lasting solution to Nigeria's tomato demand and supply crisis. Instead, importation is done at the detriment of the local farmers because it has the potentials of reducing employment opportunities by the sector, reducing the local tomato output there by reducing the economic activities of national tomato value chain as a whole. Fortunately, however, tomato supply can be improved by increasing its production and reduction in tomato glut and its losses. (Chidi, 2012)

Several studies (Musa and Choji, 2009; Babalola *et al.*, 2010; Orefi *et al.*, 2011; Adesina, 2012; Aworh, 2012 and Chidi, 2012, Donkoh *et al*., 2013) were conducted on the economics of tomato supply in Africa at large and Nigeria in particular, many of these studies were concentrated on the production aspect with a view to increasing the size of tomato production supply Other studies (Aminu and Musa, 2003; Adepetu *et al.*, 2005; Rohatash *et al.*, 2011, IIRR, 2012 and Bongiwe , 2013) paid more attention to the analysis of the activities of market participants in making the commodity available to the final consumers Some researchers (FAO, 1989; Kordylas, 1990; Oyewole and Oloko, 2006; Babalola *et al.*, 2008; VAPG, 2008; Anjum, 2010; Anthony, 2011, Carlos, 2011 and Aworh, 2012) based their work on evaluation of post-harvest losses, processing and nutritional quality changes as a result of value added activities on the commodity.

Also, there are studies (Onwualu, 2009; Emmanuel, 2011; Furo *et al.*, 2011; Musa and Choji, 2009; Odularu, 2011; ACDI, 2012; IIRR, 2012; Obasi, 2012), on development, financing and the prospects of value addition among small-scale rural

enterprises in Nigeria but none of these studies examined value addition by tomato value chain actors at the different levels of the commodity chain from the farmers' stage up to the final consumer in Zamfara State Nigeria. This study is aimed at bridging this gap in knowledge.

It is in view of this that this study attempts to examine the economic prospect of value addition in the tomato value chain in selected LGAs of Zamfara State. The study intends to address the following research questions:

i. What are the socioeconomic characteristics of tomato value chain actors in the study area?
ii. What are the stages of value addition on tomato in the study area?
iii. What are the methods of value addition on tomato in the study area?
iv Is value addition on tomato profitable in the study area?
v Do socio-economic factors influence value addition on tomato in the study area?
vi What are the institutional factors influencing value addition on tomato in the study area?
vii How is the level of tomato famers' linkage with other stakeholders along the value chain in the study area?
viii Are there problems along tomato value chain in the study area?

1.3 Objectives of the Study

The broad objective of the study is to determine the economic prospect of value addition on tomato in the study area.

The specific objectives of the study are to:

i. describe the socio-economic characteristics of tomato value chain actors;

ii. examine the stages of value addition on tomato in the study area

ii. identify the methods used in value addition on tomato in the study area;

iii. determine the costs and returns associated with tomato value chain;

iv. examine the socio-economic factors influencing value addition on tomato;

v. examine the influence of institutional factors on tomato value addition;

vi. examine the level of tomato farmers' linkage with stakeholders along the value chain.

vii. Identify problems associated with tomato value chain.

1.4 Hypotheses

Ho_1: There are no significant differences in the mean values added among the value chain actors

Ho_2: There is no significant relationship between Socio-economic characteristics of actors and value addition on tomato

Ho_3 There is no significant relationship between institutional factors and value on tomato

1.5 Justification of the Study

The relevance of tomato as a component of majority of Nigerian dishes, raw material for industrial use, and source of income to farmers, marketers and the country at large cannot be overemphasized as noted by (Musa and Choji, 2009; Orefi *et al.,* 2011, Chdi, 2012). The persistence in the relevance of tomato and the rapidly growing population aggravate the continuous increase in the demand for it and unfortunately, its perishability and inadequate value addition in tomato value chain affects its supply as noted by (Aworh, 2011). Thus, the need to look into tomato value addition chain so as to identify the constraints causing the unacceptable reduction in the quantity, quality and

hence value of the current local tomato production. This will in turn be useful in reducing tomato wastage and hence increase the quantity and quality of the locally supplied tomato in the study area.

Therefore, the results of this work will be useful to actors along the tomato value addition chain because the consequences of reduction in wastes is increased income for the farmers, wholesalers and retailers and will also be useful to consumers as a result of the possible increase in the commodity's supply caused by reduction in tomato wastage. Information from this work will be beneficial to agricultural development planners and policy makers in formulating relevant developmental programs and policies that will help in reducing the detrimental losses in the quantity, quality and value of tomato. Also the study will generate information on value added on tomato at the different stages of the value chain verifying the most efficient method and level of value addition on tomato in the study area. This will serve as a guide to actors in tomato value addition chain on how to utilize their resources wisely and hence profit maximization. Equally, information on the economic potential in tomato value addition and solutions to the existing constraints impeding the numerous efforts by government, non-governmental organizations and even individuals' to harness the benefits of tomato value addition chain will serve as a guide and encouragement to prospective value addition chain actors who might want to invest in tomato value addition activity.

1.6 Scope and Limitations of the Study

The study covered Bakura, Bungudu, Maradun, Maru, Talata Mafara and Tsafe Local Government Areas (LGAs) where tomato is intensely produced and marketed in Zamfara State. The study limited to such tomato value chain actors as input suppliers,

farmers, processors wholesalers and retailers who are concerned with increasing the quantity, quality and value of locally produced tomato. Data were collected in 2015 and efforts to increase the sample size due to time lag were frustrated by insecurity. The research faced the problems of different sizes of the units of measurement across the study area and that of non-response from the actors because of their fear for personal safety. To overcome these problems, this study used conversion of local measures into kilogram as the unit of measurement and the services of 6 village extension workers who are familiar operators in the study area were employed.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

Among the most important constraints that reduced the quantity and quality of locally produced tomato that reach the consumers are tomato glut, perish-ability and inadequate value addition activities as noted by Awoh (2011). As a result of these constraining factors, tomato value chain actors' suffered serious loses that may sometimes force some of them out of the value chain. Babalola (2010) reported that up to 50 percent of the locally produced tomato is lost before reaching the consumers.

The use of value chain tradition to improve the quantity and quality of agricultural commodities had been an important strategy to increasing the supply of agricultural output and reducing the inherent losses in the value of agricultural output, more especially such perish-able commodities like tomato. This could be traced back to Wallersteins (1974) who came up with the idea of commodity chain in the world system theory which was explained as network of labour and production processes whose end results is finished commodities. In further development, Hopkins and Wallersteins (1974) saw all firms as being in commodity chain as either producers of input to others or users of input from others. These notions had been used in discussing international chains for agricultural products.

This was noted from Gereffi *et al.*, (1994) who used Global commodity chain with more emphasis on industrial commodity chain while ignoring the cyclical context and focus more on the emergence of a new global manufacturing system in which economic integration goes much beyond international trade in raw materials and final

products to include centrally coordinated but internationally dispersed production of many of the activities along the chain of given manufactured goods.The model which place premium on international commodity chain, has been grossly criticized because it has little or consideration on the standard of living of the poor citizenry of developing economies and therefore unable to bring about the needed rural transformation, thus there is need for works that pay special attention to agricultural commodity value chain in Africa at large and Nigeria in particular. Research that emphasized on development of such agricultural commodity chain as tomato will help in reducing bottle necks as well as improve its production, supply, quality and thus its competitiveness.

The Francophone filiere tradition on the other hand had its origin in technocratic agricultural research in 1960. The tradition is seen as neutral and purely applied to developing nations' commodity chains. Therefore its analysis is applied to developing countries agricultural commodities chain so as to improve the efficiency of their value chain. The concept of "value chain" was introduced by Porter (1985) to describe the full range of activities, which are required to bring a product or service from conception, through the different phases of production, distribution to consumers, and final disposal after use. Porters' value chain concept was based on the observation that location specific condition determined the competitive advantage of location. The analysis of this concept emphasized on the relevance of local rivalry and specific demand condition.

Further, Porters concept suggested that the activities of a business could be grouped under two headings as follows the primary activities which include those that are directly concerned with creating and delivering a product (e.g. the use of improved

production technologies); and support activities, (e.g. research and financial support) which even though they are not directly involved in production of goods and services, may increase efficiency (e.g. of the value chain actors' activities). As the product moves from one level of the value chain to another, therefore more value is stored in the commodity. Thus value chain is a means that can be employed to disaggregate business into the numerous and inevitable activities that lead to value addition, this allow for easy identification of sources of competitive advantage.

Following its introduction, the use of value chains and value chain analysis has been expanding as it is extended to cover areas beyond the scope of individual firms. Value chain analysis has been employed to examine and evaluate entire industries and industry clusters, as well as specific systems within firms. It has likewise been employed to examine activities that are increasingly spread over several countries or the so-called "global value chain" (GVC). This segment of the value-chain literature is also known as global commodity chains, global production networks, or international supply chains (Sturgeon *et al*., 2012). GVC defines economic upgrading "as a shift to higher-value-added products, services, and production stages through increasing specialization and efficient domestic and international linkages" (Ernst, 2004); and it emphasizes the importance of international linkages to create cross-border forward and backward linkages such as international knowledge linkages that compensate for the narrow base of domestic knowledge (Lall, 1997; Ernst, 2004).

Recently, the aspect of value chain has been extended to examine whether economic upgrading, especially by global firms, necessarily leads to social upgrading which is defined as the "improvement in workers' rights and entitlements, and

enhancement of the quality of their employment" (Lee *et al.,* 2011) While earlier management literature tended to focus on the firm as the main production unit, more recent studies have used value chain analysis in the areas that goes beyond the boundaries of the firm and even the industry. Value chain analysis addresses the weaknesses of traditional analysis, which tends to be static and limited in terms of identifying factors for success (Kaplinsky and Morris, 2003). Value chain analysis focuses on the dynamics of complex linkages within a network, wherein both value creation and value capture occur in a value system that includes suppliers, distributors, partners, and collaborators, thus extending the firm's access to resources and opportunities (Zott, *et al.,* 2011).

Chiu *et al.,* (2012) used value chain data envelopment analysis (DEA) as evaluation framework to study production efficiencies of high-technology businesses. This framework allowed the measurement of production efficiencies in a single implementation, consisting of two stages: stage one involves the calculation of R&D process efficiency, the output of which is patents; patents in turn serve as inputs to stage two, which involves the calculation of production efficiency. Findings from the study show that R&D efficiency does not relate to operation efficiency. The additional value of innovation and R&D in operation performance is not adequately apparent among most of the high-tech businesses; only a few businesses actually pay attention to both R&D and operation efficiencies, although under the value chain framework, simultaneously allocating resources for both R&D and production efficiencies is critical for the success of high-tech enterprises. Another interesting finding is that improving both R&D and operation efficiencies require decreasing R&D resource

consumption and increasing operational final outputs, as well as reducing patents that do not effectively create value.

Loebis and Schmitz (2005) studied the furniture industry of Central Java, Indonesia to determine whether SMEs in this sector have benefited from their participation in the global market. They cite two opposing views on the source of innovation: local cluster theory asserts that knowledge needed for upgrading of products and processes comes from within the cluster, while global value chain theory stresses that such knowledge comes from outside the cluster, in particular from global buyers. Loebis and Schmitz found through visits to Semarang, Jepara and Klaten and discussions with business people in these and other locations in Central Java, that while the furniture chains are buyer-driven, the upgrading prospects depend largely on the nature of relationships that producers have with their buyers.

The results of this concept had positive influence on local economic development and cluster initiatives. Therefore, it could be deduced that applying the knowledge from these theories on the analysis of value adding activities along tomato value chain in the area of this study is an extension in knowledge and would help in reducing tomato glut, wastage; poor price and would therefore have positive bearing on the lives of citizenry of the area.

2.2 Analytical Frame Work

Value addition: The subjective neoclassic economic theory of value is based on the notion of marginal utility and equilibrium, marginal productivity and the distribution of products and enhancements to utility analysis, developed in the late nineteenth and early twentieth century. The marginal productivity and the distribution of products as

emphasized by Euler's theorem was that to maximize profit entrepreneurs reflect on the productivity of each productive service when offering a price for that service just as the way owners of each productive service have regard for the best price they can obtain for providing that service. In the same way that consumers maximize utility by focusing on comparative marginal utilities under competitive conditions, so too would entrepreneurs maximize profit, and the owners of productive services maximize income when the price of productive services in reflects their comparative "marginal product" provided of course that those services are used to produce goods that are the most highly valued by consumers (King and Michael, 2012)

Economists have long measured added value using the metric value added. It is the difference between value of shipments and the cost of all purchased inputs used in the production. Value added can be estimated at the firm level and aggregated across firms in an industry to get industry value added. (Wolfe, 1999) Thus, in the words of Wolfe, value added is an important economic parameter. At the firm level, value added is determined as the gross value of output less purchased inputs and contract labour. At the industry level, it is divided into two values: gross value added and net value added. Gross value added is obtained from the value of an industry's output of goods and services less the value of its intermediate consumption of goods and services while net value added is the value of output less the values of both intermediate and fixed capital consumption (Ial, 1999).

Total value added is very closely approximated by total labor expense plus "Cash" operating profit defined as operating profit plus depreciation expense, the first component (total labor expense) is a return to labor and the second component (operating profit

before depreciation) is a return to capital (including capital goods, land, and other property). Strictly speaking: Value-added is the increase in value of a particular piece of wood. It can happen usually by additional manufacturing, but it can also happen by better marketing. t all value-added is profitable. When calculating the value-added, we do not subtract manufacturing costs. So, value-added is a "gross" number, while profits are net (Wood Web, 2002).

Cowan (2002) asserted that to determine value added on agricultural commodities, the differences between the monetary value of the output and the value of the input used in producing the output must be captured. Cowan specified the value added model (VAM) as follows.

$E = (C + D) - (A + B)$ ---------- (1)

Where:

E = added value on agricultural commodity

C = value of byproduct

D= value of commodity after processing

A = value of agricultural commodity before processing

B = cost incurred in processing

ACDI/VOCA (2008) used value chains, specifically value chain analysis, to understand private sector development in emerging economy settings to jumpstart economic growth and poverty reduction. It uses a participatory, stakeholder-driven approach to exploit opportunities for investment and growth in industries with high levels of micro and small enterprise involvement. The value chain approach analyzes the firms in a market chain from input suppliers to final buyers and the relationships among them.

It analyzes the factors influencing industry performance, including access to and the requirements of end markets; the legal, regulatory and policy environment; coordination between firms in the industry; and the level and quality of support services. Relationships among firms in an industry can facilitate production and marketing efficiencies and enable the flow of information, learning, resources and benefits.

Inuwa (2010), reported value addition as a process of increasing the economic value of a commodity and determined the value added on rice at each stage of the value chain using the value added model which was specified as VA = Cpt – Cpu (2) Where:

VA = Value Added

Cpt = Cost of purchasing transformed paddy rice

Cpu = Cost of untransformed paddy rice

Spring (2011) viewed Value added as a commonly used measure of output and as such it represents the wealth created through the organization's production process or provision of services. So value added measures the difference between sales and the cost of materials and services incurred. Value added can be calculated using either the Subtraction Method or the Addition Method.

The Subtraction Method emphasizes the creation of value added. It measures the difference between sales and the cost of goods and services purchased to generate the sales. Thus value added is determined as follows

Value added = Sales – Cost of purchased goods and services (Spring, 2011)

The Addition Method emphasizes the distribution of value added to those who have contributed to the creation of value added.

Value added = Labour cost to employees + Interest to lenders of money +Depreciation for reinvestment in machinery and equipment + Profits retained by the organisation + other distributed costs (eg tax)

Value added = Sales – Cost of purchased goods and services

Where:

Sales Refers to revenue earned from products sold or services rendered by the organisation. It excludes miscellaneous and other non-operating income. In manufacturing, not all goods sold are produced in the same period. The change in inventory level should be subtracted from sales for a better reflection of the value of output produced during that period and Purchased goods and services include raw materials, supplies, utilities and services (e.g. insurance, security, professional services) bought from external suppliers. (Spring, 2011)

Furo *et al.*, (2011) used VAM to assess the prospect of value addition among small scale rural enterprises in Adamawa state, Nigeria. Furo *et al.*, (2011) adopted VAM as in Cowan (2002) thus E = (C + D) - (A + B) ---------- (3)

Where:

E = added value on agricultural commodity

C = value of byproduct

D= value of commodity after processing

A = value of agricultural commodity before processing

B = cost incurred in processing

2.2.1 Models of Qualitative Choice

Qualitative analysis methods (probit, logit and torbit) are used to analylise, describe and or predict, the influence of explanatory variable which may be discrete or continuous in nature on a dependent variable that is either categorical, ordinal, nominal or discrete in nature that represent a set of choice or classification. They predict how likely an event is to occur. They are also employed where a dependent variable has the property of jumping discretely to zero or any other threshold. The dependent variable takes on a binary form, that is, values between 0 and 1. The dependent variable must meet the following criteria:

The set of choices or classification must be finite;

The set of choices or classification must be mutually exclusive, that is a particular outcome can only be presented by one choice or classification and

The set of choices or classifications must be collectively exhaustive, that is all choices or classifications must be represented by the choice set or classification.

The models are required to the requirement of theoretical plausibility, explanatory adequacy and accuracy of estimates (Eboh, 2009)

Logistic regression enables us to use a binary categorical variable as a dependent variable so that the dependent variable can take on only two values 0 and 1. That is if Y=1 it means the event we are predicting occurs and Y= 0 if otherwise. In reality one out of the two outcomes will occur. Therefore logistic regression is used to predict the probability that an event occurs, for example either the company will default on its loan or not. Thus the probability that an event occurring could be model as: $p = b0 + b1x1 + b2x2 + ----- + bnxn + e$ ---------- (1)

To transform the probability which is always between 0 and 1so as to reflect both the positive and negative numbers, equation 1 is rewritten as:

Log (odds) = b0 + b1x1 + b2x2 + --------- + bkxk

Because Odds are able to uniquely represent the information that is contained in a probability. If p = 0, then odds = 0/1 = 0, if p = ½, odds = (1/2)/ (1/2/1- 1/2) = 1. As probability approaches 1, the odds increases toward + α. transforming the probability that an event occurs into log odds that an event occurs enable us to account for the positive and the negative numbers (Alan, 2009)

2.3 Empirical Review

2.3.1 Actors along Tomato Value Chain

Tomato value chain actors are the players in making tomato available to consumers. They include tomato farmers, input suppliers, tomato processors, retailers and tomato wholesalers each of these actors plays significant roles in the tomato value chain for instance; tomato farmers are the value chain actors whose major activity is tomato production, input suppliers supplies agro input to farmers, tomato processors purchase tomato and transform it to extend its usability, tomato wholesalers are the actors who engaged in the purchase and supplying of large quantities of tomato and sell mostly in bulk to other market participants (wholesalers and retailers) but also sell to final consumers in rare cases while tomato retailers are actors who obtain tomato supplies from both the farmers and wholesalers for resale mostly in small quantities to the final consumers

According to Aminu and Musa (2003) main actors in tomato value chain include input providers, producers, small scale processors and retailers and to a large degree

industries that engaged in the production of tomato paste and canned tomato. Tomato production is dominated by small to medium scale farmers that have reached a substantial level of market orientation. Also a number of large scale commercial farmers operate in the sector often with direct link to processors. There are also private service providers including middlemen, traders, transporters, and suppliers of processing equipments and materials and to a limited degree, financial services providers. Aminu and Musa (2003) conceptualized tomato distribution chain in the as follows.

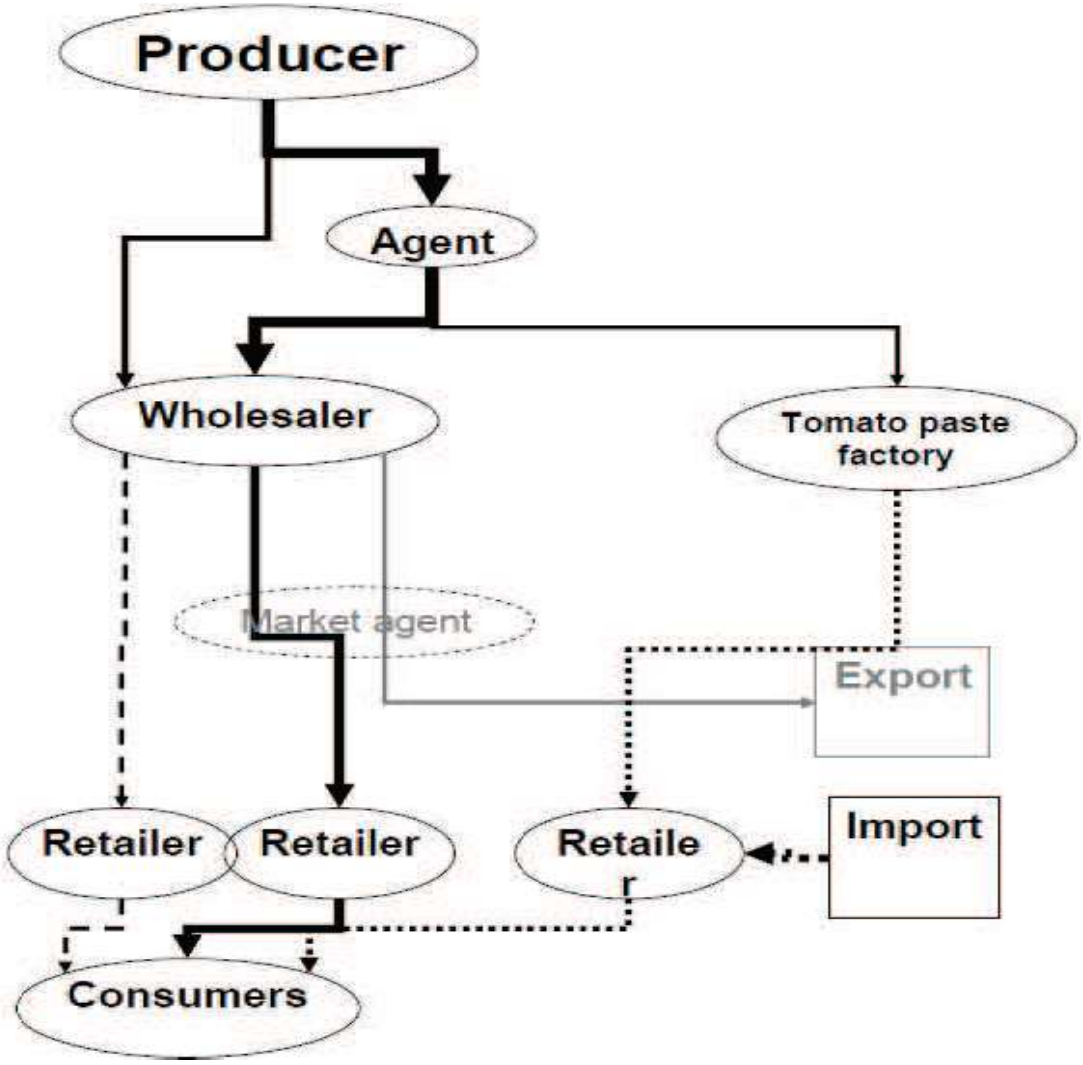

Fig 1: Organization of Tomato Commodity Chain Flowchart

Source: Aminu and Musa, 2003

The main channel of distribution involves the producers, the commission agents, the assemblers or regional wholesalers, the urban wholesalers, retailers and finally the consumers.

In a study on institutions and interactions in vegetable marketing in Jos Plateau State Nigeria, by Adepetu *et al.*, (2005) it was reported that tomato value chain involves the farmer, through bulk purchasers, wholesalers, middlemen, and retailers. The latter sell directly to the consumers, while at Farin-Gada market, middlemen sell directly to both retailers and bulk purchasers. In addition to assemblers Bulk Purchaser buys from commission agent for shipment to the southern urban markets. Every bulk purchaser has an agent at each destination. It is the agent who takes delivery of the tomato, sells it to retailers and remits the proceeds to him/her. The retailers operate throughout the retail centers in Jos metropolis. They also carry out street by street hawking of tomatoes and other vegetables.

However, Adepetu *et al.,* (2005) observed that in the lower markets, there were slight increases in prices and decline quality of the commodity. This is more likely to be worse during the rainy season when there is a seasonal scarcity caused by decline in production, as the tomato variety planted does not thrive in very humid condition. This is the time of the year when the urban poor experiences slightly reduced access to quality tomatoes. At such times, the rich are able to afford the higher priced exotic supplies or the tinned/processed substitutes, which are beyond the reach of the poor. The long term involvement of traders suggests that it is a good opportunity particularly for poor urban women as the initial entry requires very little or no capital. Adepetu *et al.,* (2005) concluded that today, the activities of the actor in the value chain are highly organized.

Each of them has an association whose registration for membership is compulsory for all its members.

In a study on tomato market chain conducted by Department of Agriculture, Forestry and Fisheries (DAFF, 2011) in South African, it was reported that the industry employs approximately 22,500 people with at least 135,000 dependents. Multipliers in the supply chains are the transport of the tomatoes to the fresh produce markets and processing plants, processing factories, fresh produce markets, independent traders, supermarket groups, packaging factories, informal traders and fast food outlets. A significant proportion of this total workforce was composed of low skilled, minimum wage laborers.

In a study on resource use efficiency on tomato production in Kogi state Nigeria, Ibitoye *et al*., (2015) used purposive sampling technique to select eight local government areas from four agricultural zones; two communities were randomly selected from each of the selected local government areas. Data were analysed using descriptive statistics, multiple regression analysis and efficiency ratio. The results from regression analysis revealed that years of schooling extension contact and farm size positively and significantly influenced tomato output. The coefficient for age is negative and therefore affects tomato output negatively. The efficiency ratio revealed that pesticides, seed and fertilizers were being over utilized while labour and farm size were being underutilized. The research recommended price of input be subsidized, adequate extension services be in place, policies be geared toward farmers' education and should form cooperative societies.

Oluwemimo (2015) used multistage sampling procedure to select 100 vegetable farmers from 10 local government areas in Oyo State Nigeria. Data from the study were analyzed using descriptive statistics, gross margin and multiple regression analysis.

Results on profitability analysis revealed total variable cost of ₦ 177,056.65, total fixed cost of ₦ 13,313. 38 and average revenue of 649,379.20 thus the gross margin and net revenue for tomato production was ₦ 172,322.00 and ₦ 154,564.72 per annum respectively. The expense structure ratio was 0.100 indicating that for every ₦ 100.00 spent on vegetable production ₦ 10.00 was on fixed input that is ₦ 90.00 was on variable input. The rate of return of 2.33 means a return of ₦ 233.00 for every ₦100.00 invested in vegetable production. The results further revealed that educational level of farmer, Farming experience, farm size and total farm expenditure relate positively and significantly with net farm income.

Oluwemimo (2015) stressed that major challenges facing vegetable production include transportation, storage, marketing and pest infection. The study recommended provision of efficient transport system, farming programs that aimed at reducing poverty and or subsidizing farm inputs and policy measure that focus on agricultural technology.

Abimbola (2014) randomly selected 115 tomato farmers, data were analysed by the use of descriptive statistics, gross margin and multiple regression analysis to examine: the socioeconomic characteristics of tomato farmers and constraints associated with tomato farming, the profitability of tomato farming and the effect of post harvest losses on the welfare of tomato farmers, respectively. The explanatory variables for this study was : market participation rate, marital status, years of formal education, age of tomato farmer, size of farm land, farming experience, time spent on the farm, primary

occupation, household size and value of post harvest losses. Results of the study revealed that majority of the farmers were male, married farmers had no formal education, their farm size for tomato cultivation ranges from less than one hectare to ten hectares, thus tomato production is on large scale in the area.

Results of the profitability revealed a gross margin of ₦ 345.551.00 and ₦ 7,800,921.80 with and without post harvest loss, respectively. Results on the determinants of household welfare indicated positive relationship between market participation rate, farm size; time spent on farm, primary occupation and per capita income, meaning that increase in the coefficients of these variables increase the welfare of tomato farmers in the area. While value of post harvest losses, land size and family size had negative influence on per capita income. Therefore increase in the coefficients of these variables reduced the welfare of tomato farmers in the area. Post harvest constraints include: inadequate storage facilities, long distances to markets, poor transportation network, pest and disease and poor access to credit facilities. The study recommended adequate training of farmers on post harvest handling technique and improvement on storage facilities and linkage roods (Abimbola, 2014).

In a research on structure and efficiency analysis of vegetable production and marketing in Pakistan, Mari (2009) used production function analysis and marketing margin to investigate the institutional relationship across the market actors in supply chain of vegetables. The study found four types of relationships in vegetable marketing system in Pakistan as follows. Producers and Assemblers, Producers/Assemblers and Commission Agents, Commission Agents and Wholesalers and wholesalers and Retailers, The tomato value chain analysis revealed that producers received the highest

margin reflecting the fact they bear the highest costs and most of the risk among all marketing agencies. The maximum tomato producer share in consumer's retail price in Sindh was 44 % in early season, and the minimum share of 42 % during mid season, which is followed by wholesalers 30% and retailers 27% while commission agent received the lowest share of 3%. The result further revealed that the highest percentage profit margin was received by the wholesalers, followed by the retailers and then the producer.

2.3.2 Profitability along Tomato Value Chain

Tomato value chain consists of cost incurring and revenue generating activities. Profit results when revenue from the business is more than the costs incurred by the business. Therefore tomato value chain is profitable if the actors receive advantageous results.

In a study on tomato commodity chain in Kano state Nigeria with the objective of increasing the productivity of small-scale farmers and improve their access to market, Aminu and Musa (2003) reported the performance of tomato farming enterprise at the farmer level using farm budget and sensitivity analysis. The gross and net revenue per acre were estimated based on the predominant price per standard farmer basket (30kg) during the season. The average productivity per acre of tomato among the farmers was found to be 430 baskets and the predominant price was 100 naira per basket. The study revealed ₦70, 967 as cost of tomato farming per acre, ₦43, 000 as the gross revenue and ₦ -27,967 as the net revenue per acre of tomato in the area. From the cost benefit analysis it can be seen that at the predominant price of one hundred naira per basket farmers were

not getting positive net return per acre. Hence tomato farming in 2003 was generally unprofitable and this serves as a significant disincentive to farmers.

A sensitivity analysis was conducted to see how the gross and net margins per acre varied under the different price regimes. It can be noted that farmers will obtained a positive net return per acre at the price of 200 and 500 naira per basket and the break-even price was around 155 naira per basket. Therefore below 155 naira per basket of tomato, farmers will only received negative net return per acre and this will affect the sustainability of the tomato farming. The main problems identified during the study include excess supply which affect all actors along the chain particularly the producers who usually received poor prices for their produce as a result and the non-functional tomato processing plants at the local and national level that can provide alternative outlet for farmers and traders (Aminu and Musa, 2003)

Furo *et al.,* (2011) reported that the interest of most of the international donor agencies/projects is to devise and implement Policies that will move the teeming farmers from the subsistence to semi-commercial or commercial agriculture through value addition of farm produce. They employed a 'comparative market price analyses' to assess the prospects of small scale farmers in value addition in Adamawa State Nigeria. The result of the study revealed that hot pepper and tomato processing had the highest profit margin among the vegetable (₦2180 each). Furo *et al.,* (2011) concluded that the prospects of value addition in the small scale enterprises in the area are viable; this was more valid among the vegetable and grain processors than livestock.

2.3.3 Methods of Value Addition on Tomato in Nigeria

Methods of value addition on tomato encompasses all the procedures employed by the value chain actors, that lead to increment in such tomato attributes as its production, productivity, quality and reduction in tomato wastage as well as extension of its usability.

In a study on Value-added agricultural products with the objective of creating value for customers, Curtis and Nakamoto (2004) identified marketing as a value adding process. It is the process of providing the final consumer with a product he/she wants at a price he/she is willing to pay. Successful marketing involves an exchange process in which each exchange adds value in some way to the product. Each of the participants in the exchange process, i . e the seller and the buyer must gain some benefit, because marketing creates such value for consumers as the form value where marketing activities convert raw materials into finished or semi-finished products thereby increasing the usability of the product and Maintaining the product quality through sorting, Cleaning, grading, cooling processing and packaging. Marketing add location value to commodities by providing product at a desired place for consumers' convenience. Tomato retailers carry out street by street and door to door hawking of tomatoes and other vegetables for profit.

Curtis and Nakamoto (2004) further added that marketing processes add time value to commodities by providing product at a desired time through seasonality storage, scheduling, transportation and processing. It also adds the value of possession to commodities via temporary and permanent transfer of title. These include farm Equipment rentals, Procurement of harvesting and or land clearing Equipments. They also stressed the relevance of adding the value of information in agricultural marketing

which is mostly done through marketing functions such as advertising, promotion, packaging, and labeling. They concluded that value-added products are customer oriented and that there are many opportunities to create value for consumer. Value-adding involves exchanges where buyer and seller must benefit.

Aminu and Musa (2003) identified fresh, dried and canned tomato as common forms of tomato used by consumers in Kano-Nigeria. Between January and April, the supply of fresh tomato is adequate and thus consumers' rarely used the other forms. However, from April to September the supply of fresh tomato drastically decline and thus representing the off-season period for the crop and during such period consumers turn to the other forms. This causes price to fluctuate and thus affecting consumption patterns of the consumers. Generally consumers in the study area used other form of tomato when the fresh is not very much available due to seasonality. The consumer preference test revealed 25% used fresh tomato only; 29% used fresh and dried only; 24% used fresh, dried and canned tomato and 22% used fresh and canned tomato only. The chain is characterized by somewhat complex interrelationship and interaction between various actors and enterprises involved in the tomato farming, distribution, and processing and consumption chain. According to Furo *et al.,* (2011) Sun drying was the common tomato value addition method adopted in Adamawa state Nigeria.

In a study on Sustainable agriculture for increasing efficiency of tomato - value chain in Uttarakhand India, Rohatash *et al.,* (2011) used multistage sampling technique for selection of the study area, purposive sampling technique was used for selection of Stakeholders dealing with tomato and snowball sampling was used to collect information from the actors. 40 farmers, 20 wholesalers, 2 processing units, 20 retailers and 20

commission agents were selected for the study. Data were analysed using descriptive statistics. The study revealed that majority of the cultivators graded their produce and only few of the farmers do packaged their produce. Thus local collectors have to bear the cost of transportation, cost of loading and unloading, weighing charges, commission of the agents and market commission. Commission agents help farmers in dealing with transaction of tomatoes, while middlemen buy tomato from the commission agents according to their shop requirements.

Result of the study further revealed that because of the various methods of value addition that existed right from farmer through the value chain to the final consumer, price of tomato increases to 200 per cent and farmer got only 50 per cent share of consumer's price Sometimes the Middlemen have to bear losses because of less demand in market and it becomes rotten when they keep it for more than 2 to 3 days. Middlemen either sell directly to the consumers or to the small retailers. 30 percent of the price was commission of local collector for his services. Commission agent took the produce from farmer and charged 8 per cent as commission per transaction. Wholesalers sold to small retailers at a commission of 8 per cent/ Kg. Retailers charged 4 percent /kg of tomato as their commission for supplying tomatoes to the consumer (Rohatash *et al.,* 2011).

Value-adding methods of agricultural enterprises allow producers to earn a greater portion of consumer expenditures by processing, packaging and/or marketing crops, livestock or other farm resources (Megan, 2008) "value-added" methods includes an agricultural commodity or product that has undergone a change in physical state or was produced, marketed, or segregated (e.g. identity-preserved, eco-labeling, etc.) in a

manner that enhances its value or expands the customer base of the product Value-added producer grants (VAPG, 2008).

In a regional agro-industries forum Middle East and North Africa Carlos (2011) reported that Agro-industries generate strong backward and forward linkages, promoting demand for and adding value to primary agricultural production and creating employment and income along the processing distribution chain. Agro-industries occupy a dominant position in manufacturing about 61 % in agriculture-based countries, 42 % in countries in transformation and 37 % in urbanized developing countries. The contribution of agro-processing ranges from 20-35% of GDP in developing countries while the entire food-system may account for as much as 50% of developing country GDP. Additionally, agro-industries also play a central role in employment generation, being characterized by a marked presence of women in their workforce Some of the challenges include the fact that meeting the required standards and contracts are difficult for smallholders; Small-scale agro-processors are unable to compete with large scale manufacturers and traders in local markets are squeezed out by specialized procurement practices and certified products.

The study suggested creating enabling policies, institutions and services, supporting specific industries and promoting integrated value chains and providing information and analysis to value chain stakeholders as some of the positive ways forward for the countries (Carlos, 2011). In a survey on post harvest handling, preservation and processing methods of tomato in Ghana Anthony (2011) reported that right after harvesting, if the tomato is to be processed, little handling is required before

they are transported to the processing plant in the shortest possible time. Once at the plant, they should be processed immediately or at least stored in the shade.

Ellis *et al.,* (1998) reported that although tomato is a highly perishable crop, the rate and extent of spoilage depends on several factors and that, to overcome this problem calls for the need to develop simple, cost-effective and easily adaptable preservation techniques. The study added that doing this requires a better understanding of the farm management system of farmers. Tomatoes can be processed into many forms to be consumed instantly or preserved for future use. For example, according to

Kitinoja and Gorny (2009) horticultural produce are usually processed to become part of the following categories: Beverages, Condiments, Confections and Miscellaneous unfortunately, in developing countries, there is lack of storage facilities on-farm or at wholesale or retail markets and lack of ventilation and cooling in the very few existing on-farm facilities.

Kitinoja and Gorny (2009) further added that Other factors aiding tomato spoilage in storage to include over-loading of cold stores (where available) placing warm produce into the cold room, stacking produce too high (beyond container strength) and the practice of mixing produce with others with different temperature and relative humidity requirements stressing that some cultivars of tomato have a naturally longer storage potential than others. Adubofour *et al.,* (2010) also reported about formulating four cocktail juices in different 3ratios from a combination of carrots, tomatoes (Bolga variety) and two varieties of orange and pineapple. A promotion of this could help increase the consumption of the vegetable whiles helping swab the excess.

Ashby (2000) described a simple home-drying method for stewing tomatoes. Ripe tomatoes are steamed or dipped into boiling water to loosen skin, chilled in cold water, peeled and cut into sections about ¾ inch wide, or slice. These are blanched for three minutes and dried in the dehydrator for 10 – 18 minutes or twice this time using the conventional oven. Other preservation methods described by FAO (1989) include pulping method, the drying method and the peeled tomato preservation method.

According to USAID (2008) in a study on Mali tomato value chain, although Collecting, washing, sorting, and packing are what most processing consists of in the tomato at the present time, a fraction of the national harvest is processed into other marketable forms. Tomatoes require an exceptional degree of business investment, infrastructure, and logistical organization to serve significant markets. Mali may evolve first in expanding its dried tomato activity and building new long-term market linkages, as the markets are there and the required technology uncomplicated. Notwithstanding the Malian disinterest in dried tomatoes, this item is more popular in the West African region and in Europe, which in 2005 imported 3,790 MT of dried tomatoes while the United States of America imported 11,100 MT in 2005. West Africa plays a very small role in serving this EU market, although Senegal (110 tons in 2005) is in the lead. Competing successfully against Tunisia, Morocco, and Israel (USAID, 2008)

Malaisamy and Parimalarangan (2007) reported that Food processing sector in India is one of the largest in terms of production, consumption, export and growth perspectives. As a result of the continuing reform process such as the several policy initiatives undertaken since liberalization in August 1991, food processing industry has drawn a considerable amount of Foreign Direct Investment (FDI) in the last few years.

And as such the industry has witnessed fast growth in most of the segments. Hence, recently, India has started the export of processed tomato. India's exports mainly consist of tomato ketchup/sauce, paste/chutney. In the export of processed products tomato paste contributes a large share and touched the level of 68 thousand tones this is a substantial jump from the base of 30 thousand tones. The study identified challenges to the food processing sectors to include absence of post harvest practices at the farm level.

2.3.4 Factors Affecting Value Addition on Tomato

Factors are attributes that play some role for certain results to occur. Factors affecting value addition by tomato value chain actors may include such socio-economic attributes as age, marital status and educational level of the actors as well as institutional factors such as access to credit and extension services. Adejobi et al., (2011) used a two stage sampling technique to purposively select four market places where fresh tomato marketers are located at the second stage; fifteen marketers were randomly selected from each of the selected markets. Data were analyse using descriptive statistic, budgetary and regression analysis. The budgetary technique was used to determine the profit margin of fresh tomato marketers while regression analysis was used to determine the effect of the determinants of profit margin (explanatory variables) on the profit margin (dependent variable).

Results of the study revealed 19 years as the average years of marketing experience and that metallic plate and Plastic plate were the most commonly used measure by tomato marketers in the area. Even though there 100 percent policy awareness among marketers, up to 90 percent of them used other measures not approved by government. The cost and returns analysis indicated cost of transportation, labour,

rent, membership of association fee and security as the cost of marketing incurred by tomato marketers in the study area. The average marketing cost for tomato was ₦ 369.00 per month. Analysis of the profit margin revealed ₦ 3,798 as the average monthly profit margin for tomato retailers. The study concluded that level of education, marketing costs; years of experience and type of measurement used in selling tomato affect the profit margin of fresh tomato marketers in the area (Adejobi et al., 2011).

Akerele and Oyebanjo (2014) used multistage random sampling technique to select six towns and twenty respondents from each of the selected towns. Descriptive statistic, multiple regression analysis and production function were used to analyse the data. The results of the research revealed 50.5 years as the average age of farmer majority of who were male, married and experienced. The study further found out low level of education, credit size and few available farm land affect acquisition and utilization of skilled labour to improve farmers output. Reduction in the cost of cultivars, fertilizers and land increases farmer's income and his willingness to use more productive assets. Age, farm size and annual income status of the farmer correlate positively with the farmer's willingness to acquire assets while sex, costs of fertilizers and carriage of farm produce correlate negatively with asset acquisition. The study concluded that farmers' profit depend on farm size, fixed and variable expenses, family size, hired labour and location of the farm.

In a study on analysis of institutional factors influencing vegetable production among small scale farmers in South Africa Phatela and Ajuruchukwu (2015) used purposive sampling technique to interview farmers participating in six projects. Data were analysed using descriptive statistic and binary logistic regression to determine the

influence of institutional factors on small holder farmers' main reason for vegetable production. The institutional factors modeled are; management committee meeting frequency (MCMF), management committee strength (MCS), management committee weakness (MCW), Idea of association formation (IAF), Land ownership (LO), Working strategy on production on field (WSF), Working strategy in marketing (WSM), presence of an extension services (PES), Condition of roods (CR) and relationship to the municipality (RM). Results of the study revealed that few of the vegetable farmers in Nompu and Gquma were aged, majority were male, married and educated.

Results on the organizational structure indicated that the management committee had some strength in motivation and dispute resolution among the project members while the major weakness of the committee was lack of power to lobby for formal markets across the entire project. The results of the logit regression revealed that increase in the frequency of the management meeting influenced farmers working with the project to produce vegetable for sale. It was also found out that if the idea of project formation comes from the participants then their production decision is for sale and consumption signaling that in a situation where farmers are engage in decision, they tend to be flexible. The research further reported that farmers who work collectively in the field produce vegetable for sale and consumption, equally, the coefficient for marketing strategy revealed the likelihood that collective marketing influenced small holder farmer to produce vegetable mainly for sale (Phatela and Ajuruchukwu, 2015)

Emmanuel and Charles (2012) used a two stage sampling procedure to identify vegetable growing areas and then randomly selected vegetable growers to determine factors influencing market channel choice. Data from the study were analyse using

logistic regression analysis. The model evaluated the determinant of market channel choice, the dependent variable with the binary response set as y=1 if farmers access formal market and y=0 if they accessed informal market. Results of the study revealed that mobile phone ownership, producer price, cooperative membership negatively related with market channel choice meaning that these variables influence farmers to participate in the informal markets while farm size and marketing risk influenced farmers to supply formal market. To enhance farmers bargaining power, the study recommended farmers to develop effective mechanisms for collaboration and linkages and should also invest on market intelligence.

2.4 Conceptual Framework

Value addition is a process of increasing the economic value and consumer appeal of an agricultural commodity. It is a production/marketing strategy driven by customer needs and preferences. Value addition in agriculture is the process of adding value to a raw agricultural product by changing it or adding something to it so that people want more of it (Anjum, 2010).

Value added is used to describe instances where a firm takes a product that may be considered a homogeneous product, with few differences (if any) from that of a competitor, and provides potential customers with a feature or add-on that gives it a greater sense of value (Investopedia, 2012).

Value-added Agriculture is an alternative production and marketing strategy requiring the understanding of food safety issues taking cognisance of the consumer preferences. Cowan (2002) simply puts value added agriculture as a phrase that expresses the difference between the value of agricultural goods sold and the cost of inputs used in

producing them. Therefore, in order to determine value-addition of agriculture commodities, the difference between the value of sold products and the inputs used in producing the products must be captured.

Value chains encompass the full range of activities and services required to bring a product or service from its conception to its end use. Value chains include input suppliers, producers, processors and buyers; a range of technical, business and financial service providers; and the final markets into which a product or service is sold, whether local, national, regional or global (ACDI/VOCA, 2008). “Value chain” refers to all the activities and services that bring a product (or a service) from conception to end use in a particular industry from input supply to production, processing, wholesale and finally, retail. It is so called because value is being added to the product or service at each step. Taking a “value chain approach” to economic development means addressing the major constraints and opportunities faced by businesses at multiple levels of the value chain. (ACDI/VOCA, 2012)

The term value chain refers to the full range of activities that are required to bring a product (or a service) from conception through the different phases of production to delivery to final consumer. A value chain will contain a number of core processes which for a simple agricultural commodity could include input provision, production, processing, wholesaling and retailing (MIC, 2005).

The United State Agency for International Development (USAID, 2002) reported that value addition in agriculture results whenever a change in the physical state or form of an agricultural product occurs or by the adoption of a production method or handling process which leads to an enhancement in the customer base for the product. Onwualu

(2009) defined Value addition as activities that results in generating products and or creating characteristics on the products that are more preferred in the market place. Value chain analysis is a tool for analyzing the nature and source of value within a supply chain and the potential for reducing waste therein, with the focus explicitly on the determinants of value within a manufacturing process rather than the simple measurement of process outputs. (Mari, 2009) Martins and Patrick (2010), identified socioeconomic, market, product as well as business strategic goals as factors influencing value addition.

Thus determinants of value addition on tomato include: land size; labour; marital status; household size; level of education; years of experience; quantity of input; Quantity of tomato processed; Access to markets and Quantity of tomato handled. Value addition on tomato (the dependent variable) is influenced by age, land, labour, family size, education, experience, costs of input, quantity of input, method of processing, access to markets and quantity of tomato handled (the explanatory variables)

2.4.1: Definition of Terms

Input supplier: Is a actor who plays the role of procuring and selling of such agro-input and equipments as seed, fertilizer, insecticide, herbicide, fungicides, sprayers that are needed for agricultural production activities. These actors regard input supplying as their main business.

Tomato farmer: Is a value chain actor who plays the role of preparing the soil to produce tomato. These actors regard tomato farming as their main business. One of their major activities includes the use of improved tomato production techniques to increase the quantity, quality and hence value of tomato along the chain.

Tomato processor: Is a value chain actor who plays the role of transforming tomato into a more storable commodity thereby reducing tomato glut and making it available consumers all year round. Therefore, the activities of tomato processor are expected to increase the value of tomato along the chain.

Tomato wholesaler: Is a value chain actor who purchases large quantities of tomato, store, transport and sale the commodity mainly to other wholesalers and retailers. Tomato wholesalers regard tomato marketing as their main business. The services rendered by wholesaler are expected to increase value along tomato value chain.

Tomato retailer: Is a value chain actor who procures tomato mainly from wholesalers and farmers usually in small quantities, transport; sort; wash; display and sale tomato to consumers. Their services add value on tomato and also ease consumer's access to the commodity.

Age: is the period of time that a value chain actor existed. The age of an actor is determined by the number of years that the actor lived. Age of actors may affect value addition either positively or negatively depending on the age group.

Farm size: is the total land area committed to tomato farming by an actor. It is measured in hectares and it normally affects value addition on tomato positively.

Labor: Is the human activities used in the process of value adding on tomato along the value chain. Sources of labor supply on tomato value chain may either be from the family or hired. It is measured in an adult man day and its naira equivalent. Labor supplied to carry out value addition activities is expected to influence value addition positively.

Household size: Is the number of individuals in the family. Productive household members determine labor availability for the family's value chain activities in Africa thus, if productive, it is expected to have positive effect on value addition on tomato.

Level of education: Is the knowledge gained by the actors as a result of attending school which enables the value chain actor to learn comprehend understand and adopt improve technology in value addition on tomato. Level of education is measured in number of years an actor spent in school to acquire education. It is expected to positively influence value addition activities on tomato.

Experience: Is the number of years through which an actor has been adding value on tomato. Years of experience is expected to influence value addition positively because actors with more years as players in value addition are expected to be more efficient in managing resources through the value addition activities along the value chain.

Access to markets: Is the number of markets that are accessible to the value chain actors. It is measured in number and it is expected to relate positively with value addition on tomato.

Quantity handled: It is the amount of: agro inputs supplied by the input supplier, tomato output produced by the farmer, tomato processed by tomato processors and tomato sold by tomato marketers. Quantity handled is measured in liters and kilogram and is expected to have positive relationship with value addition on tomato.

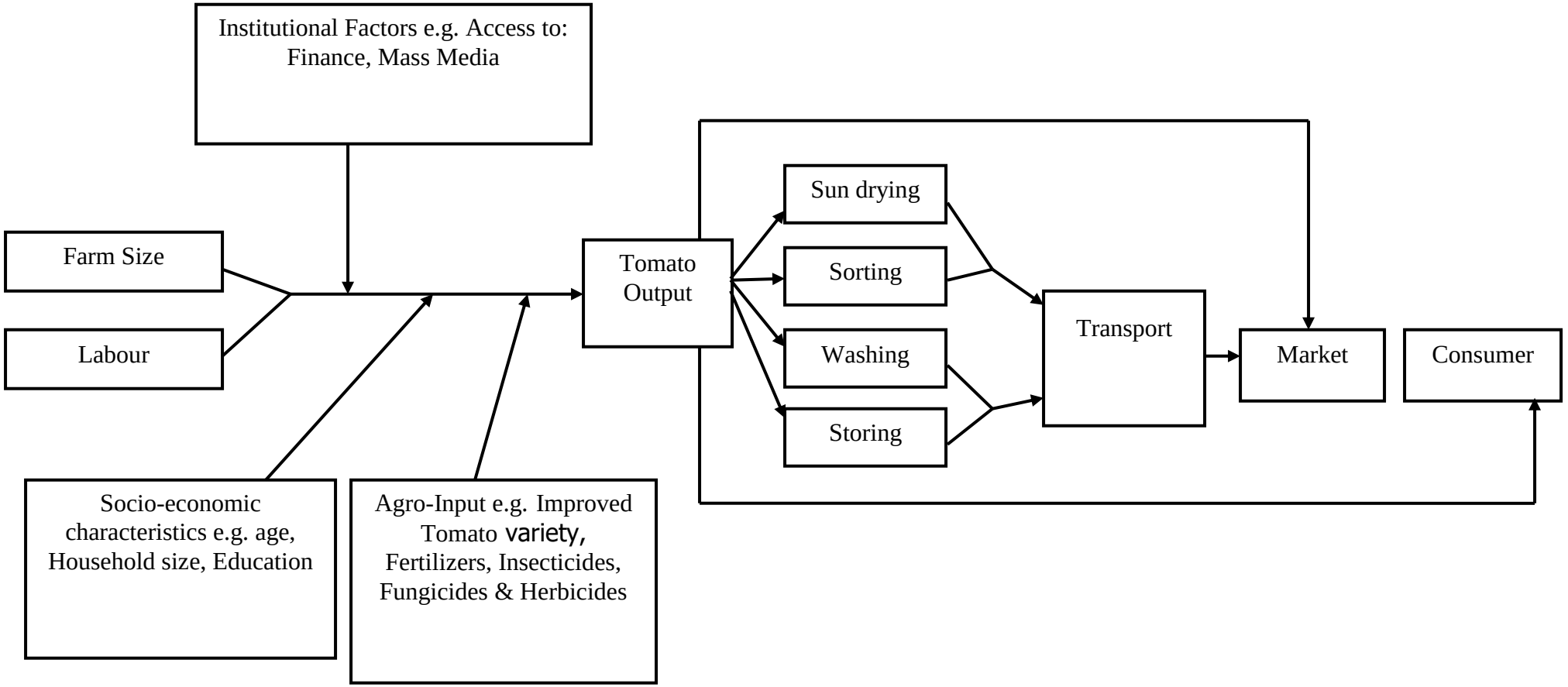

Fig 2: Conceptual Framework

Source: Field survey, 2015

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

3.1.1 Location

Zamfara State came into existence in 1996. The State is located in the northwestern part of the country with a land area of 38,418 square kilometers. Zamfara State is located between Latitudes 12° 09’ to 12° 46” North and Longitudes 06°39’ to 06° 40' East (ZSG, 2007). It shares common boundaries with Sokoto State to the North and West, Kebbi State to the West and South, Niger State to the South, Katsina State to the East and Kaduna State to the South (ZSG, 2007).

The state falls within Sudan and Guinea Savannah Ecological zones. The climate is hot and semi-arid with a minimum temperature of 28 °C and a maximum of 39 °C. Rainfall starts from June and ends in October with a gradual rise from 400mm in May to maximum of 1000mm in August and a sharp decrease in September and October (ZSG, 2007). The latitudinal location, rain fall, temperature and soil type of Zamfara State favors tomato production. Ebimiewei *et al*. (2013) reported that the major tomato producing areas in Nigeria lies between latitude 7-5 N – 13 N and temperature range of 25°C - 34°C.

NPC (2006) reported that Zamfara State has a projected population of 4,328,270 people in 2015. The inhabitants of the area are mainly Hausa and Fulani, however other Nigerians are found to be residing in the area. Farming is the major occupation of the inhabitant. About 82 percent of the people in the area are farmers operating mostly on small-scale with an average farm size of 1-2 hectares. Crops cultivated include millet,

sorghum, rice, maize, cowpea, groundnut, tomatoes, lettuce and carrot and so on (Z S G, 2007).

3.2 Sampling Procedure

Sample frame was established in each of the selected LGAs by using a list of 9,212 tomato value chain actors (farmers, input suppliers, tomato processors and marketers in Zamfara State compiled by Zamfara Agricultural Development Project (ZADP) and a list of the names of tomato farmers, tomato processors and marketers obtained from the results of a preliminary survey conducted by the researcher in the study area. The sampling frame included all tomato farmers, tomato processors and tomato marketers (wholesalers and retailers) in the state. Multi-stage sampling technique was adopted in selecting the sample for the study. In the first stage, tomato producing areas in the State, which include Bakura, Bungudu, Gusau, Maru, Talata Mafara and Tsafe Local Government Areas (LGAs), were purposively selected for the study. The selection was informed by the intensity of tomato production and marketing activities in the selected LGAs. The second stage involves the selection of three from each of the selected LGAs giving a total of 18 villages. To determine the sample size for the study, Yamane's sample size formula was employed. Thus following Polonia (2013) and Anigbogu *et al*. (2014) the formula is stated as follows:

$$n = N/\mathbf{1 + N * (e)^2} \text{ ---------- (4)}$$

Where

n = the number of actors to be sampled

N = population size

e = the acceptable sampling error

Thus:

$n = 9212/1 + 9212\ (0.05)^2 = 9212/\ 24.03 = 383 \equiv 438$

Actors' sample size for each of the selected Local Government Areas was conducted using the formula below:

$s = n/N * 438$ ---------- (5)

Where:

s = actors' sample size per LGA

n = number of actors in each of the LGA

N = population size

In stage three the value chain actors were stratified into four base on the identified stages of value addition (tomato farming, tomato processing, tomato wholesaling and retailing) from each of the stratum a random sample of 5% of the value chain actors were randomly selected as shown in Table 1 which revealed that a total of 134 tomato farmers, 72 processors, 52 wholesalers and 114 retailers were randomly selected. Therefore a total of 372 actors were used for this study.

Table 1: Sampling Frame of Actors in Tomato Value Chain in the Study Area

LGAs	Villages	Farmers		Processors		Wholesalers		Retailers	
		Total	Number Selected	Total	Number Selected	Total	Number Selected	Total	Number Selected
	Bakura	220	11	81	4	93	5	249	12
Bakura	Rini	172	8	53	3	40	2	150	7
	Birnin tudu	196	9	90	4	35	1	91	4
	Bungudu	179	9	62	3	28	1	126	6
Bungudu	Nahuce	97	4	56	3	00	00	65	3
	Rawayya	130	6	54	2	00	00	33	2
	Gusau	215	10	134	7	249	12	431	22
Gusau	Magami	154	7	119	6	117	6	97	4
	Wanke	177	9	97	4	96	4	116	5
	Maru	69	3	40	2	28	1	112	6
Maru	Ruwan Doruwa	104	5	36	1	00	00	35	1
	Yatasha	121	6	50	3	00	00	21	1
	Talata Mafara	244	12	131	7	163	8	327	15
Talata Mafara	Makera	216	10	119	6	69	3	121	6
	Jangebe	212	10	114	4	48	2	140	7
	Tsafe	99	4	73	3	88	4	198	10
Tsafe	Keata	151	7	111	6	19	1	49	2
	Yankozo	72	4	96	4	33	2	33	1
Total		2828	134	1512	72	1106	52	2394	114

Source field survey, 2015

3.3 Data Collection Procedure

Data for this study were collected from primary and secondary sources. For the primary data, questionnaires were used to elicit information from tomato value chain actors, from the month of November 2014 to March 2015.Three visits were paid to each

of the selected LGAs to administer the questionnaires by the researcher with the help of six trained enumerators to obtain information on tomato production, distribution channels, determinants of value addition on tomato, purchase and selling prices of tomato, various methods' of value addition on tomato and their respective costs, transportation, storage among others. The secondary `information was mainly lists of tomato farmers, processors, marketers and tomato prices compiled by ZADP and Zamfara state Fadama III project. Data were collected from the month of November to March 2015.

3.4 Methods of Data Analysis

In order to achieve the objectives of the study, various analytical tools were employed in analyzing the data generated. The tools used were descriptive statistics; Value added model and Multiple Regression analysis. Descriptive statistics were used to describe the socio-economic characteristics, stages of value addition on tomato, methods of value addition on tomato, level of tomato value chain fixing and problems associated with tomato value chain (objectives i, ii, iii, vii and viii). Value added model (VAM) and ANOVA were used in evaluating the value added on tomato at each stage of the value chain (objectives iv), Multiple Regression analysis was used to determine the socio-economic factors influencing value addition on tomato (objective v) and logit regression model was used to determine the influence of institutional factors on tomato value addition (objective vi)

3.4.1 Value Added Model Based on Economic Value

Value added model (VAM) is used to assess the level of value addition on a commodity by the value adders along the commodity chain (Cowan, 2002, Inuwa, 2010,

Spring, 2011 Furo *et al*, 2011), Based on the identified levels of value addition on tomato in the study area and the value added models specified in Inuwa 2010, this study determined the value added on tomato at each stage of the value chain using the equations specified below:

$VAF = C_{PT} - C_{PU}$ ---------- (6)

Where:

VAF = value added by tomato farmers; (Naira)

C_{PT} = receipt from the sales of tomato (Naira)

C_{PU} = cost of tomato farming (Naira)

$VAI = C_{PT} - C_{PU}$ ---------- (7)

Where:

VAI = value added by Input suppliers; (Naira)

C_{PT} = Input suppliers' selling price (Naira)

C_{PU} = Input suppliers' purchasing price (Naira)

$VAP = C_{PT} - C_{PU}$ ---------- (8)

Where:

VAP = value added by Tomato processors; (Naira)

C_{PT} = Tomato processors' selling price (Naira)

C_{PU} = Tomato processors' purchasing price (Naira)

$VAW = C_{PT} - C_{PU}$ ---------- (9)

Where:

VAW = value added by wholesalers; (Naira)

C_{PT} = wholesalers' selling price (Naira)

C_{PU} = wholesalers' purchasing price (Naira)

$VAR = C_{PT} - C_{PU}$ ---------- (10)

Where:

VAR = value added by retailers; (Naira)

C_{PT} = retailers' selling price (Naira)

C_{PU} = retailers' purchasing price (Naira)

In order to find out whether there is significant differences in the mean value added among the value chain actors, one way analysis of variance (ANOVA) was employed to test the null hypothesis that there are no significant differences in the mean value added among the value chain actors in the study area. Bashiru *et al.,* (2014) reported Anova as a useful tool in comparing means of three or more variables that are independent while stressing that Anova uses F statistics in validation of hypothesis. Thus this study adopted the F statistics as specified in Bashiru *et al.,* (2014) as follows:

$$F = \frac{MS_B}{MS_W} \sim F(\alpha, K-1, N-K) \text{ ---------- (11)}$$

Where: $MS_B = SS_B/df$ and $MS_W = SS_W/df$

The sum of square total which shows the variation of the observation around the sample grand mean was specified as $SS_T = \Sigma X^2 - (\Sigma X)^2 /N$

Where:

$N = n_1 + n_2 + n_3 + \text{---} + n_k\text{-}1 + n_k$

N is the total Number of actors, n1 is the number of ith actor and X is the mean value added. The sum of squares between the groups (SS_B) is a measure of the variation in the sample mean about the sample grand mean which is measured as follows:

$SS_B = [(\Sigma X_1/n_1)^2] + (\Sigma X_2/n_2)^2 + \text{----} + (\Sigma K_{K-1}/K_{K-1})2 + (\Sigma K_K/n_k)2] - (\Sigma X/N)^2$

While the sum of the variations of the individual observations about the corresponding sample mean (SS_W) specified as:

$SS_W = [\Sigma X^2 - (\Sigma X_1/n_1)^2] + [\Sigma X_2^2 - (\Sigma X_2/n_2)^2] + \text{----} + [\Sigma X_K^2 - (\Sigma X_K^2/n_K)^2$

The decision rule is reject null hypothesis if the calculated F value is greater than the tabular F value at a particular significance level.

3.4.2 Multiple Regression Analysis:

Multiple regression analysis was used to determine the influence of value chain actors' socioeconomic characteristics on tomato value addition in the study area. The explicit functional forms of the models were specified for tomato farmers, input suppliers, tomato processors, wholesalers and retailers respectively, as follows:

Where

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7\,X7 + \beta 8\,X8 + \beta 9\,X9 + ui \quad (12)$$

Where

α = Constant

β = Parameters to be estimated

Y_i = Total value added by tomato farmers (₦)

x_1 = Age (years)

x_2 = Land (Ha)

x_3 = Labour (Man day)

x_4 = Marital status (Dummy 1= single, 2 = married)

x_5 = Household size (Number)

x_6 = Level of education (Years of schooling)

x_7 = Experience (Years participating in value chain)

x_8 = Quantity of fertilizer for tomato farming (kg)

x_9 = Quantity produced (kg)

ui = Error term

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7\,X7 + \beta 8\,X8 + ui \quad (14)$$

Where

α = Constant

β = Parameters to be estimated

Y_i = Total value added by processors (₦)

x_1 = Age (years)

x_2 = Household size (Number)

x_3 = Level of education (Years of schooling)

x_4 = Experience (Years participating in value chain)

x_5 = Cost of input

x_6 = Marital status (Dummy 1= single, 2 = married)

x_7 = Access to markets (Number)

x_8 = Quantity of processed (kg)

ui = Error term

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7\,X7 + \beta 8\,X + ui \quad (15)$$

Where

α = Constant

β = Parameters to be estimated

Y_i = Total value added wholesalers (₦)

x_1 = Age (years)

x_2 = Household size (Number)

x_3 = Level of education (Years of schooling)

x_4 = Experience (Years participating in value chain)

x_5 = Cost of wholesaling

x_6 = Marital status (Dummy 1= single, 2 = married)

x_7 = Access to markets (Number)

x_8 = Quantity of handled (kg)

ui = Error term

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7\,X7 + \beta 8\,X8 + ui \quad ---(16)$$

Where

α = Constant

β = Parameters to be estimated

Y_i = Total value added by retailers (₦)

x_1 = Age (years)

x_2 = Household size (Number)

x_3 = Level of education (Years of schooling)

x_4 = Experience (Years participating in value chain)

x_5 = Cost of retailing

x_6 = Marital status (Dummy 1= single, 2 = married)

x_7 = Access to markets (Number)

x_8 = Quantity of handled (kg)

ui = Error term

The null hypothesis which states that socio-economic characteristics of actors in the tomato value chain do not add value to tomato in the study area was tested using p value from the regression estimate.

3.4.3 Expected signs on the multiple regression coefficients

Variables included in the model and their expected signs are presented in table 2

Table 2: Description of Explanatory Variables in the Regression Model and the Expected Sings

Variable	Description	Measurement	Expected sign
Age	age of tomato value chain actor	Years	+ -
Farm size	Area of land used for tomato farming	Hectare	+
Labour	Work force supplied to carryout value chain activities	Man day	+
Household size	Number of individuals in the family	Number	+
Level of education	Education level of the value chain actor	Years of schooling	+
Experience	Time period through which an actor has been adding value on tomato	Years	+
Access to market	Number of markets accessible to actors	Number	+
Quantity handled	Quantity handled by actors	Kilogram	+

3.4.3: Logistic Regression Analysis:

Logistic regression model was employed to test the probability that institutional factors influenced value addition by actors along the stages of tomato value chain. In the

study area, it is assumed that an actor is faced with two choices subject to institutional factors and he/she struggle to add value on tomato either for both consumption and sale or for consumption alone. Therefore the binary response was set as Y = 1 where actors add value for both consumption and sales and Y = 0 where actors add value for consumption alone. Though logit regression does not require that the independent variable must be interval; normally distributed and can handle nonlinear effects yet, to achieve stable and meaning full results, it requires much more data

This study adopted the logistic model specified in Phatela and Ajuruchukwu (2015) as follows:

$$Z = \text{In}\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \text{ -------} \beta_k x_k \text{ ----------} \quad (17)$$

$$\frac{p=(yi=1|xi)}{p=(yi=0|xi)} = \text{Odds} \quad \text{----------} \quad (18)$$

Equation 18 presents two probabilities which include yi= 1 representing the probability that actors add value for both sale and consumption and yi = 0 representing the probability that actors add value for consumption only.

Equation 18 which presents the outcome of the logit transformation of odds ratio can be rewritten as:

$$\text{Odd ratio} = \text{Antilog ln} = \left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \text{ -------} \beta_k x_k = \text{Exp}\,(\beta i) \text{ ---------} \quad (19)$$

Where:

$\beta 0$ = constant

β_1, β_2 ----- β_k = the regression coefficients of the individual predictor variable

x_1, x_2 ------ x_k = explanatory variables

Fitting the variables of this study into the logit regression model gives

$$Z = \text{In}\left(\frac{p}{1-p}\right) = = \beta 0 + \beta 1 ACF + \beta 2\ AMM + \beta 3 NTVEA + \beta 4 NTAAMI + \beta 5 MCS \text{ -----}$$

---------- (20)

Where

Y0 = actors add value for consumption only.

Y1 = actors add value for both consumption and sales.

β0 = constant

β0 ----- β4 = the co-variants

The null hypothesis which states that there is no relationship between institutional factors and value on tomato in the study area was tested using p value from the logistic regression estimate.

The variable included in the model and their expected signs are presented in table 3

Table 3: Explanatory Variables in the Logistic Model and the Expected Sings

Variable	Codes	Definition	Sign
Access to credit facilities	ACF	Amount of money received	+
Access to mass media	AMM	Number of time accessed	+
Number of times visited by extension agents	NTVEA	1 if many times, 0 if otherwise	+
Number of times an actor accessed market information	NTAAMI	1 if accessed, 0 if otherwise	+
Membership of a cooperative society	MCS	1 if a member, 0 if otherwise	+/-

3.4.4 Level of Tomato Value Chain Linkage

Level of tomato farmers' Linkage with other stakeholders in tomato value chain was calculated by determining the number of farmers that have interacted with each of the stakeholders as categorized into four below:

1 no linkage =0%

2 weak linkage = < 50%

3 Strong linkage = 51-69%

4 Very strong linkage = 70-100%

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

The chapter presents and discusses the results of the study. The chapter is organized into the following sections: Section one presents and discusses important socio-economic characteristics of tomato value chain actors which include age, gender, marital status, family size, educational attainment and years of experience and so on. Section two dwelled on the various levels at which value is added on tomato as it moves through the value chain. Section three features information on the costs and returns associated with each level of the commodity's value chain. Section four discusses the results of the study on the influence of socio-economic factors on tomato value addition. Section five deals with the results of the study on the influence of institutional factors on the value chain actors' decision to add value on tomato. Section six furnishes information on the level of tomato value chain fixing in the study area. Section seven discusses the problems associated with tomato value chain in the study area.

4.1 Socio-economic Characteristics of Tomato Value Chain Actors

4.1.1 Age of Tomato Value Chain Actors

Age is a very important factor at all levels of agribusiness activities more especially as it influences output levels in agricultural industries. Table 4 presents the age distribution of tomato value chain actors in the study area.

The age of tomato farmers, input suppliers, processors, wholesalers and retailers had a range of 21 to 75 years, 21 to 70 years, 21 to 64 years, 21 to 66 years 21 to 75 years and a mean of 38 years, 41 years.40 years, 39 years and 36 years respectively, Majority

of the tomato value chain actors' fall within the age group of 31-50 years thus, the results implied that most of the actors in the area are in the peak of their economic activities.

Table 4: Distribution of Tomato Value Chain Actors According to Age

Age group	Farmers		Input Suppliers		Processors		Wholesalers		Retailers	
	n = 134		66		72		52		114	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
21 -30	14	10.45	3	12.50	5	6.94	7	13.46	20	17.54
31-40	55	41.04	21	29.17	23	31.94	12	23.07	40	35.08
41-50	39	29.10	25	34.72	35	48.61	27	51.92	43	37.72
51-60	18	13.43	13	18.06	7	9.72	5	9.62	8	7.03
61Above	8	5.97	4	5.56	2	2.77	1	1.92	3	2.63
Minimum	21		21		21		21		21	
Mean	38		41		40		39		36	
Maximum	75		70		64		66		75	

Source: Field survey, 2015

n = Sample size

The implication of this is that the tomato value chain actors take the advantage of their youthful age in conducting the value chain activities. This finding is in line with the findings of (Falola *et al.,* 2014) who observed that 79% of the value adders were within the age range of 20-50 years, Falola *et al*, 2014 reported 42 years as the average age of the value adders while stressing that more of the value adders were in their active productive age. It is also in line with the findings of Usman and Bakare (2013) who reported that 88 percent of tomato farmers in Adamawa were aged 31years and above implying that the tomato farming is dominated by adult who were in their active ages. Ugwuja *et al.,* (2011) revealed 45 years as the average age of farmers who actively learn and adopt such improve technologies as fertilizers in tomato farming. The findings are also supported by Emehute *et al.,* (2014) who reported that majority of gari processors in Abia State were between the age group of (41-50 years).

Table 4 further revealed that the participation of young and the aged actors in tomato value chain is very low in the area. By implication this means that participation in value addition is affected by age. Even though the younger actors in the area are also physically active, yet they are less experienced a in tomato value chain activities and thus may be less productive while the elderly actors on the other hand are less physically fit and hence less productive as an effect of old age. This is in line with the findings of Ahmad et al. (2012) that only 3.8 % of the tomato farmers fall below the age of 30 years. 48.5 % of them fall within the age range of (30-45 years) while 44.7 % were in the age range of 46-60 years and only 3.0% of the respondents were either 61 years of age or more while the average age of the respondents was 45.8 years.

The result of the study is also supported by the findings of (Chukwuji and Dicta, 2014) that 3.6% of the respondents were within the age range of less than 20 years and more than 50 years while majority (83%) of them were between the range of 20-50 years. Chukwuji and Dicta, (2014) stressed that majority of dry season Okra producers in the study area were in their active age. Furo *et al.* (2011) reported that the aspects of value addition on agricultural commodities were an adult venture in the north-eastern parts of Adamawa State. It is also supported by Joseph *et al.*, (2013) who reported that up to (39.50%) of the sampled participants in farm activities in Benue state were within the age range of 41-50 years. This signified low involvement of youth in agricultural activities.

4.1.2 Gender Composition of Tomato Value Chain Actors

Gender is a yardstick used for grouping people into male and female. Gender of a person influences his/hers functions in the society. Table 5 presents the distribution of tomato value chain actors according to gender.

The distribution in Table 5 show that tomato value chain activities were dominated by male at all the identified levels of value addition (Tomato farmers, input suppliers, processors, wholesalers and retailers) while their female counterpart formed the minority in the study area.

Table 5: Distribution of Tomato Value Chain Actors According to Gender

Gender	Farmers		Input Suppliers		Processors		Wholesalers		Retailers	
	n=134		66		72		52		114	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Male	120	89.55	55	83.33	57	79.17	49	94.23	99	86.84
Female	14	10.45	11	16.67	15	20.83	3	5.77	15	13.16

Source: Field survey 2015

n = Sample size

The dominance of male over female could be connected to the African tradition that female depend more often than not on male as parents, brothers and/or husbands. Male are often seen as the bread winners of the family in the study area. Female are exclusively seen as house wives and so their economic activities are most often than not linked to their husbands. This finding is in line with the findings of Adamu *et al.,* (2014) that 80% of the participant in fadama III project in Gombe State ware male. Fakayode *et al.,* (2012) also reported that majority (82.7% and 70.7%) of the fruit and vegetable farmers respectively were male in the area.

Haruna *et al.,* (2012) reported that 88% of the sampled tomato marketers in the area were male. The researchers' further added that the low participation of women has to do with religion and culture of the study area. Furo *et al.,* (2011) contributed that in terms of gender, male constituted the majority (60.00%) of the sampled tomato processors in

Adamawa State while about 40.00% of them were females. The researchers further stressed that the dominance of the male over female could not be unconnected with their economic status.

4.1.3 Marital Status of Tomato Value Chain Actors

Marriage is an important institution in Africa at large and Nigeria in particular. It is a Medium through which the National population increases in number. Thus marriage has significant influences on population growth and hence labour availability for national growth. Table 6 presents distribution of tomato value addition actors according to Marital Status.

Table 6: Distribution of Tomato Value Chain Actors According to Marital Status

Marital Status	Farmers		Input Suppliers		Processors		Wholesalers		Retailers	
	n=134		66		72		52		144	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Married	118	88.15	61	94.90	65	90.28	52	100	65	57.02
Single	16	11.85	5	5.10	7	9.72	00	00	49	46.35

Source: Field survey 2015

n = Sample size

The distribution of actors in Table 6 indicate that majority of the tomato value chain actors in the study area were married. This may not be unconnected with the demand for human labour in conducting most of the farm related activities in the area. This suggestion is in agreement with Inuwa (2010) who reported that 155 out of 167(92.8%) of rice value chain actors were married and further added that number of wives determine number of children available to assist the family in the farm.

4.1.4: Household Size of Tomato Value Chain Actors

Household size is the number of people that eat from one pot thus a household size comprises of the father, wife/wives, children and dependants. The distribution of household size in the area reveal that majority of the tomato value chain actors had family sizes of 6 to10 members while actors with family of less than 6 members formed the minority. The mean for the distribution of the household size is 11 members, 11 members, 9 members, 10 members and 9 members for farmers, input suppliers, processors, wholesalers and retailers respectively. Table 7 presents distribution of actors according to household size.

Table 7: Distribution of Tomato Value Chain Actors According to Household Size

House hold size	Farmers		Input Suppliers		Processors		Wholesalers		Retailers	
	n= 134		66		72		52		114	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1-5	25	18.67	9	13.64	14	19.44	4	7.69	19	16.67
6-10	48	35.82	29	43.94	31	43.05	21	40.38	50	43.86
11-15	31	23.13	12	18.18	19	26.39	16	30.77	25	21.93
16-20	19	14.78	9	13.64	3	4.17	7	13.46	11	9.65
21-25	6	4.48	3	4.55	3	4.17	3	5.77	3	2.63
Above 26	5	3.73	4	6.06	2	2.78	1	1.93	6	5,26
Minimum	3		3		6		10		3	
Mean	11		11		9		10		9	
Maximum	21		21		32		35		35	

Source: Field survey, 2015 n = Sample size

This finding is in line with Gona and Muhammad (2009) who found out majority (59.62%) of the food marketers had a family size of between 8 and 15 members while

only 23.08% had a family of less than 8 members. The number of productive member in a house hold could serve as a potential source of labour for the family use in the area.

4.1.5 Level of Education Attained by Tomato Value Chain Actors.

Education is one of the key factors that determine an individual's sociability and flexibility in his/her decision. Thus in tomato value chain, the actors' level of education could play a significant role in his ability to learn, accept and use new and economically superior technologies to improve his/hers contribution in the value chain. Table 8 presents distribution of value chain actor according to their educational levels.

Table 8: Distribution of Tomato Value Chain Actors According to Level of Education

	Farmers		Input suppliers		Processors		Wholesalers		Retailers	
	n= 134		66		72		52		114	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Quran	75	55.97	34	51.51	40	55.56	32	61.54	85	74.56
Adult	25	18.66	8	12.12	19	26.39	4	7.69	15	13.16
Primary	26	19.40	17	25.76	7	9.72	12	23.08	11	9.65
Secondy	7	5.22	5	7.58	5	6.94	3	5.77	3	2.63
Tertiary	1	0.75	2	3.03	1	1.39	1	1.92	00	00

Source: Field survey, 2015

n = Sample size

The results in Table 8 depict that all the actors had acquired one form of education or the other. However majority of them had only Quran education while those that acquired formal education formed the minority. The results revealed that even though the actors had low level of formal education, yet, up to 39.27 percent of them acquired one level of formal education or the other. This portrays the reason for the ease

with which some of the tomato value adders learn and adopt new technologies. This suggestion is supported by Chukwuji and Idoge (2014) who reported that more than 87% of the sampled farmers in Niger Delta acquired one form of formal education or the other. The study further revealed that the high level of formal education supported the ease with which new ideas could be understood and adopted for greater Okra production. Education is an important factor in the recognition and utilization of investment opportunities (Akerele and Oyebanjo, 2014).

4.1.6 Experience in Tomato Value Addition

Experience in tomato value addition indicates the period of time an actor has been engaged in the business of adding value on tomato. The number of years an actor spends in the field of tomato value addition determined his/hers' expertise. Therefore, the length of time spent in the value chain assists the actor to develop and improve his/her managerial skills thereby improving his/her efficiency in carrying out the value addition activities. According to Usman and Bakare (2013) about 45% of the sampled tomato farmers in Adamawa had less than five years of experience in tomato farming which affects their efficiency. Table 9 presents the distribution of tomato value chain actors according to experience.

Table 9: Distribution of Tomato Value Chain Actors According to Experience

Years	Farmers		Input Suppliers		Processors		Wholesalers		Retailers	
	n = 134		66		72		52		114	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1-10	30	22.39	33	50.00	13	18.06	8	15.38	23	20.18
11-20	66	49.25	15	22.73	32	44.44	23	44.23	60	52.63
21-30	28	20.90	13	19.70	23	31.94	19	36.54	27	23.68
31-40	8	5.97	4	6.06	4	5.56	2	3.85	4	3.51
41Above	8	5.97	1	1.52	00	00	00	00	00	00
Minimum	3		8		18		18		18	
Mean	14		12		15		15		13	
Maximum	36		28		23		26		30	

Source: Field survey, 2015

n = Sample size

The distribution of the value chain actors in Table 9 reveal that majority of the tomato retailers, farmers, processors and wholesalers have been actively engaged in tomato value chain for a period of 11-20 years. The distribution further shows that only few of them spent 31 years and above, as players in tomato value chain in the study area. Thus, the tomato value chain actors had a mean experience of 14 years, 12 years, 15 years, 15 years and 13 years for tomato farmers, input suppliers, tomato processors, wholesalers and retailers respectively. This finding implied that they are very well exposed to the challenges associated with the field of tomato value chain, if any. Their experience equipped them with the opportunity of taking sound decisions that will aid in reducing any natural risks that might occur. According to Emerole and Anyiro (2014), reasonable experience in farming improve the farmers ability of forecasting the feasibility

of occurrence of natural hazards and compels him/her to devise measures to reduce the likely negative impact.

4.2.1. Stages of Value Addition on Tomato in the Study Area

Tomato value chain map identifies the various points at which value is added on tomato commodity as it moves through the value chain to the final consumer. Thus figure 5 identified five different levels at which values are added on the commodity.

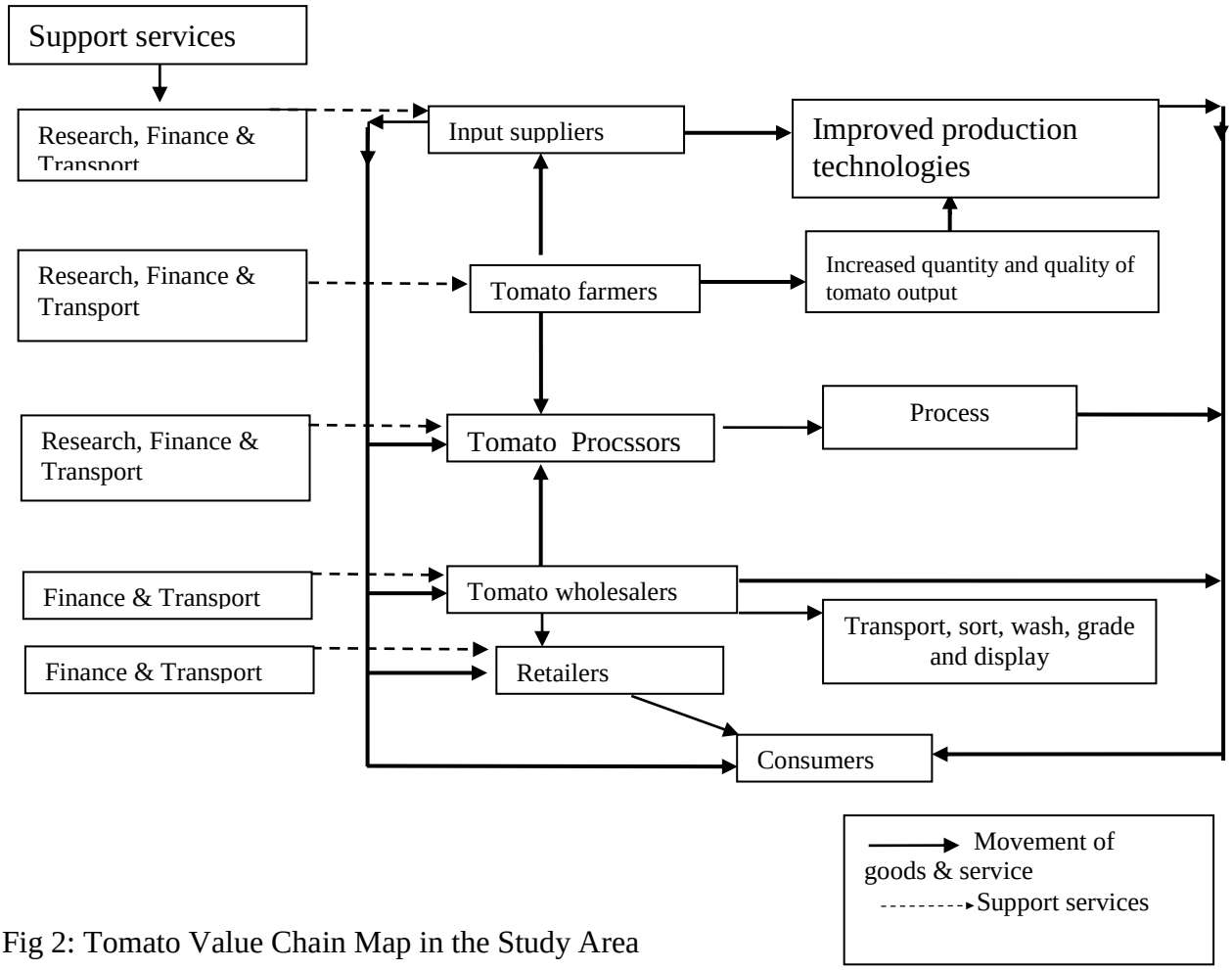

Fig 2: Tomato Value Chain Map in the Study Area

Source: Field survey, 2015

At the input supply level, the input suppliers struggle to make available to tomato farmers, improved high yielding heat tolerant tomato varieties. In addition to these, input suppliers also supply fertilizers, herbicides, insecticides and so on. These input aid

tomato farmers' production activities thereby improving tomato productivity. Tomato processors on the other hand received tomato supply mainly from tomato farmers and marketers. The processors add value on the commodity by transforming tomato into storable forms so as to reduce the inherent tomato wastage thereby increasing the consumable quantity as well as extending it usability. Tomato processors supply tomato to the marketers, restaurants and consumers.

Tomato marketers take the risk of purchasing and transporting tomato from production zones where the produce is in abundance during harvesting season to consumption zones where the supply for the commodity is sort of demand. In addition to transportation, marketers also sort, grade, wash and display tomato to attract potential buyers (consumers and other markers).

Figure 6 presents the tomato value chain map various stages at which values are added on tomato in the study area.

4.3 Activities and Methods of Value Addition

4.3.1 Activities Performed by Tomato Value Chain Actors

Generally, a value chain activity encompasses all of the processes (right from the level of tomato farmers) that are involved in making tomato available in the desired quantity and quality. The tomato value chain actors in the area of this study includes: tomato farmers, input suppliers, processors, wholesalers and retailers.

4.3.2 Activities of Tomato Farmers in the Study Area

Tomato farmers are tomato value chain actors who play the role of preparing the soil to produce tomato. These actors regard tomato farming as their main business. Some of the value adding methods performed by this group include: transportation, tomato

processing, marketing and the use of agro-input in tomato farming. Table 11 shows the distribution of tomato farmers by the method employed in the process of adding value to their tomato farming.

Table 10 showed that up to 67.16 percent of the sampled tomato farmers were engaged in tomato farming only, 26.12 percent of them combined tomato farming with it marketing and only 5.22 percent practice tomato farming in combination with tomato processing.

Table 10: Distribution of tomato farmers according to Role performed

Activity n=134	Freq	%
Tomato Farming	90	67.16
Farming/input supply	2	1.49
Farming/processing	7	5.22
Farming/marketing	35	26.12
Total	134	100

Source: Field survey, 2015

n =Sample size

However, despite the fact that the percentage of tomato farmers (that produced tomato only) across the distribution was high, they seemed to play some level of risk aversion by combining tomato farming with one level of value addition or the other. The strategy is to minimize the inherent reduction of income from tomato as a result of it spoilage and low price during peak supply. Ugonna *et al.* (2015) reported that more than 45% of tomato produced in Nigeria spoils before it gets to the final consumer adding that input are expensive while majority of tomato farmers (60%) are peasant.

4.3.3 Activities of Input Suppliers in the Study Area

Input suppliers are actors who play the role of procuring and selling of such agro-input and equipments as seed, fertilizer, insecticide, herbicide, fungicides, sprayers that are needed for agricultural production activities. These actors regard input supplying as their main business. Table 11 presents the distribution of input suppliers by the role they perform in the study area.

Table 11: Distribution of input suppliers by the Role they performed

Activity n = 66	Freq	%
Input supply only	33	50.00
Input supply/farming	19	28.79
Input supply/processing	14	21.21
Total	66	100

Source: Field survey, 2015

n =Sample size

The distribution of input suppliers in Table 13 portrays that 50 percent of the input suppliers deal with input supply only, they do not participate in the other value chain activities. 28.79 percent of them combine input supply with tomato farming. While only 21.21 percent of the input suppliers combine input supply with tomato processing. The implication of combining input supply with one or more of the value chain activities is that the actors stand the opportunity to enjoy more of the consumers' naira at different levels of the value chain.

4.3.4 Activities of Tomato Processors in the Study Area

Tomato processors are tomato value chain actors who play the role of transforming tomato into other products that are storable and desirable by consumers.

The major activities performed by processors are purchasing, transportation, sorting, slicing drying and supplying the commodity. These actors regard tomato processing as their main business. Table 12 presents the distribution of tomato processors by their activities in the study area.

Table 12: Distribution of tomato processors according to Role performed

Activity n = 72	Freq	%
Processing only	38	52.78
Processing/input supply	4	5.56
Processing/farming	24	33.33
Processing/marketing	6	8.33
Total	72	100

Source: Field survey, 2015

n =Sample size

Table 12 revealed that 52.78 of the tomato processors in the area participated in tomato processing only. They do not take part in the other tomato value chain activities. 33.33 percent and 8.33 percent of them combine tomato processing with tomato farming and marketing, respectively while only 3.70 percent took part in tomato processing and input supply. Equally, this implies that the actors are risk averse thus they combine tomato processing with other tomato value chain economic activities so as to withstand any negative outcome that might result from tomato processing only.

4.3.5 Activities of Tomato Marketers in the Study Area

Tomato marketers are tomato value chain actors who engaged in tomato wholesaling and retailing. Tomato wholesaler is a value chain actor who purchases large

quantities of tomato, store, transport and sale the commodity mainly to other wholesalers and retailers. Tomato wholesalers regard tomato marketing as their main business. Table 13 presents the distribution of tomato wholesaler by their activities in the study area.

Table 13: Distribution of tomato wholesalers by the Role they performed

Activities n =52	Wholesaler Freq	%
Marketing only	32	61.54
Marketing/farming	4	7.69
Marketing/processing	16	30.77
Total	52	100

Source: Field survey, 2015
n =Sample size

The distribution of tomato wholesalers in Table 13 indicates that majority of the wholesalers in the study area participated in tomato marketing only, while some combined tomato marketing and processing and tomato marketing and farming. Equally, this implies that the actors are risk averse thus they combined tomato marketing with tomato farming and processing in an attempt to mitigate the effect of any negative outcome that might result due to tomato marketing only.

Tomato retailer are value chain actors who procure tomato mainly from wholesalers and farmers usually in small quantities, transport, sort, wash, display and sale tomato to consumers. Table 14 presents the role performed by tomato retailers in the study area

Table 14: Distribution of tomato retailers by the role they performed

Activities n =114	Retailer Freq	 %
Marketing only	59	51.75
Marketing/farming	38	33.33
Marketing/processing	17	14.91
Total	114	100

Source: Field survey, 2015

n =Sample size

The Table (14) reveals that majority of tomato retailers took part in tomato retailing only, however some combined tomato retailing and tomato farming while others combined tomato retailing and tomato processing. These enable the actors to add more value on the commodity.

4.3.6 Methods of Value Addition along Tomato Value Chain in the Study Area

Methods of value addition in tomato encompasses all the procedures employed by the value chain actors, that lead to increment in such tomato attributes as its production, productivity, quality and reduction in it wastage as well as extension of its usability. Table 15 shows the distribution of tomato farmers by the methods they used in the process of adding value to their tomato farming.

Table (15) reveals that all the tomato farmers used improved tomato varieties, organic fertilizers and inorganic fertilizers to increase tomato productivity per land area as well as improve the quality of their tomato output which automatically increases the value addition in tomato value chain.

Table 15: Distribution of Farmers by the Role they performed in Value Addition

Inputs n= 134	Freq	%
Local Variety	3	2.24
Improved variety	134	100.00
Organic fertilizer	134	100.00
Inorganic fertilizer	134	100.00
Insecticides	108	80.60
Herbicides	92	68.66
Total	605*	

Source: Field survey, 2015

* Multiple Responses

The distribution of farmers in the Table further indicates that most of the farmers used insecticides and herbicides in their effort to add value to the tomato they produce. This shows that tomato farmers in the area use some modern farming techniques in adding value to their tomato output and hence more value in tomato value chain.

This finding implied that the use of improved production technologies assist in improving tomato farming both quantitatively and qualitatively. The finding is in agreement with the findings of Ovharhe (2014) who reported that a credit project makes resources available for farmers to increase both their operating expenditures to purchase such productive input as fertilizers, seed and so on for the current production and for additional investment for construction of tube well or power thresher. The research emphasized that the benefit of additional support on input is increased farm productivity. Table 16 presents method of value addition used by input suppliers

Table 16: Distribution of Input Suppliers by the Role they performed in Value Addition

Inputs n= 66	Freq	%
Seed	29	43.94
Fertilizers	34	56.06
Insecticides	29	43.94
Herbicides	29	43.94
Fungicides	29	43.94
Total	150*	

Source: Field survey, 2015

* Multiple Responses

The distribution of input suppliers in Table 16 shows that input suppliers in the area supplied improve technologies however majority of them supplied inorganic fertilizers, meaning that inputs needed for tomato farming are made available in the area. The implication of this is to ease farmers' access to inputs which in turn lead to improve tomato output. The results in Table 17 present the methods used by tomato processors to preserve tomato in the study area

The Table (17) shows that majority (97.22%) of the tomato processors in the area preserved tomato by sun drying while only 4.16 percent of them processed some of their tomato into paste mainly for family use only.

Table 17: Distribution of Tomato Processors by the Role they performed in Value Addition

Method n = 72	Freq	%
Sun drying	70	97.22
Tomato paste	3	4.16
Total	73*	

Source: Field survey, 2015

* Multiple Responses

Therefore, the results implied that tomato processing in the area is being carried out using local methods which involved slicing the tomato manually using knives and then spreading the sliced tomato on mats, tarpaulin and/or dry slab to expose it to scorching sun and blowing wind to facilitate drying. This method is associated with such short comings as being labour intensive, low output and low quality etc. and thus inefficient.

The use of local method could be attributed to availability of sun shine in the area, lack of accessed to affordable modern processing equipment due to inadequate finance, expensive nature of modern processing equipment and/or inadequate extension services. Okpeke (2014) reported inadequate capital and funding, lack of improved technology, inadequate processing and storage facilities coupled with poor market characterized by low pricing of products as some of the major constraints in cassava processing. Ugunna *et al.*, (2015) contributed that in northern Nigeria, some farmers process various farm products for farm house consumption and for commercial purposes. The study added that processing is done to preserve the commodities as well as to add value to it so as to earn extra income.

Hassan *et al.,* (2013) also reported that processors add value on tomato by processing fresh tomato fruits into juice, paste, ketchup, pickles or dry tomato for commercial purposes. The study stressed that there were up to 10 commercial processors existing in Jalalabad but due to shortage of appropriate market linkage, many of these enterprises have been closed down there by reducing the level of value addition on tomato in the study area.

Table 18 depicts the marketing functions performed by tomato wholesalers in their quest to add value to the locally produced tomato.

Table 18: Distribution of Wholesalers by the Role they performed in Value Addition

Activities	Wholesaler	
	Freq	%
n = 52		
Sorting	8	15.38
Washing	2	3.85
Storing	52	100.00
Transportation	33	63.46
Total	95*	

Source: Field survey, 2015

* Multiple Responses

The results in Table 18 show that tomato wholesalers in the study area used the methods of sorting, washing, storing and transportation in adding value on tomato. It reveals that all of the tomato wholesalers add value on tomato by storing the commodity while majority of them transport tomato to other places/market so as to take the advantage of price differentials between times and location there by adding value in

tomato value chain. Table 19 presents the role performed by tomato retailers in the study area

Table 19: Distribution of Retailers by the Role they performed in Value Addition

Activities	Retailer	
	Freq	%
n = 114		
Sorting	114	100.00
Washing	114	100.00
Storing	8	7.02
Transportation	56	49.12
Total	292*	

Source: Field survey, 2015

* Multiple Responses

The distribution of retailers in Table 19 reveals that all of the retailers sort and wash tomato in their attempt to add value in tomato marketing and only few of them store and transport tomato mainly due to inadequate funds which tie them to handling small quantities of the commodity. Therefore sorting, washing, storing and transportation constitute some of the post harvest handling services that lead to value addition on tomato in the study area. Comparably, Olukosi and Isitor (1990) identified labour, packaging, machinery, financing and so on as some of the resources used in providing marketing services that create such additional utility and value on commodity as time, place, form and possession utility for the consumers as the commodity passes through the market.

Ugonna *et al.,* (2015) reported grading as marketing services that consist of arranging the tomato into a number of uniform categories that conform to an economically important physical and quality characteristics through the process of identification, classification and separation. The study further added that grading of tomato is done because uniformity is one of the first attribute that buyers look for.

4.4 Costs and Returns of Tomato Value Chain Actors in the Study Area

Costs and returns of tomato value chain actors: In any production process, the producer must incur costs because to produce the desired output, input must be committed. The level of input commitment and the unit price of the committed inputs determine the costs of production while the quantity, quality, unit price and hence value of the output harvested from the production process determines the return from the business. Therefore, the relationship between the costs incurred through the production process and the returns realized from the sales of output of the business stand as an inevitable factor in the determination of the business worthiness or otherwise.

More often than not, the cost structure of a business may include both the variable costs and the fixed costs, however, in Africa and more particularly in Nigeria the costs structure of most farms are dominated by the variable costs items. The fixed costs form only a small portion of the total costs of production. Oluwemimo (2015) reported that 90.88 percent of the total costs of vegetable production as the variable costs. The study further emphasized that as variable costs constitute a very significant portion of the total costs of production, oscillations in the market price of variable input could highly impact on the gross margin obtained. Similarly, Adeoye *et al.,* (2011) found out 98.52 percent of the total costs of production as the variable costs of water melon production in Nigeria.

4.4.1 Average Costs and Returns of Tomato Farmers in the Study Area

Table 20 presents the average costs and returns associated with tomato farming in the study area.

Table 20: Average Costs and Returns of Tomato Farmers in the Study Area (naira/hectare)

Cultural activities	Quantity	Unit cost	Costs incurred/activity and revenue generated (₦)	Percentage of total cost
Variable costs (VC)				
Land preparation			18,250	11.71
Land clearing	1	4250	4250	2.73
Harrowing	1	7,000	7,000	4.49
Ridging	1	7,000	7,000	4.49
Seedling	1	1,800	1,800	1.15
Planting	7 man day	800	5,600	3.59
Fertilizers (NPK)	3bags	4,800	14,400	9.24
Weeding	16 man day	1000	16,000	10.27
Water	172 liters	138	23,800	15.28
Insecticides	4 liters	1,100	4,500	2.89
Fungicide	1 sachet	700	700	0.45
Herbicides	1.5 liters	1000	1,500	0.96
Basket	514	40	20,560	13.20
Harvesting	21 man day	920	18,900	12.13
Transportation	514	42	21,450	13.76
Total Variable Costs (TVC)			147,460	94.64
Fixed Costs (FC)				
Depreciation on farm tools*			840	0.53
Rent on land			7,500	4.81
Total Fixed Costs			8,340	5.35
Total Costs (TC)			155,800	
Revenue : output * unit price	514	400	205,600	
Value Added (VA)			58,140	

Source: Field Survey, 2015

The results in Table 20 show that tomato farmers in the area incurred total variable costs of ₦147, 460 per hectare and fixed costs of ₦ 8340 per hectare. Therefore, the farmers incurred ₦155, 800 as the total costs of producing one hectare of tomato in the area. The variable costs formed the major part (94.64%) of the total costs of producing a hectare of tomato while the fixed costs constitute only 5.35 percent of the total cost. The fact that fixed cost form only a negligible portion of the total cost of agricultural production in Nigeria, signal that variable cost is too high therefore there is the need to address the issue so as to expand fixed costs items which will eventually migrate the farmers from subsistent to commercial tomato farming. This result is reinforced by the findings of Usman and Bakare (2013) who reported 195, 216,337.42 and 125,500 as the variable costs, total cost and gross margin per hectare of tomato in Adamawa state. It is also in agreement with Yusuf et al., (2016) and Yusuf and Yusuf (2013) that variable costs incurred by rice farmers accounted for 94.39 percent of the total cost of production while fixed cost represent only 5.66 percent of the total costs incurred.

The study stressed that the low level of investment on fixed costs demonstrate the fact that farmers are still operating at subsistent level. Out of the variable cost items incurred by tomato farmers, cost of basket accounted for up to 17.71 percent of the total variable costs while costs of rent, a part of the fixed costs constituted 4.42 percent of the cost. The Table further revealed that the value added on the commodity by tomato farmers IS ₦ 58,140 per hectare. Although the results confirmed that value is being added on tomato by the farmers and that tomato farming is profitable (Table 25) in the study area, yet there is need to improve the profit level, because Abimbola (2014) found out

that despite the huge post harvest losses, tomato farmers still earned an average gross margin of ₦ 345,551 in Osun state Nigeria.

4.4.2 Average Costs and Returns of Input Suppliers in the Study Area

Table 21 presents the average costs and returns of input supplier' in the study area (naira/input supplier/year.

Table 21: Average Costs and Returns of Input Supplier' in the Study Area (naira/month)

Cultural activities	Quantity	Unit cost	Costs incurred/activity and revenue generated (₦)	Percentage of total cost
Variable costs (VC)				
Cost of cutlass	27	300	8,100.00	1.88
Cost of hoes	71	500	35,500.00	8.24
Cost of rake	15	300	4,500.00	1.04
Cost of shovel	7	434	3,038.00	0.7
Cost of seed	37	855.4	31,650.00	7.35
Cost of fertilizers	53	4508.4	238945.83	55.50
Cost of herbicides	40	744.6	29,783.58	6.92
Cost of fungicides	9	494.9	4,454.16	1.03
Cost of insecticides	35	746.75	26,136.50	6.07
Cost of baskets	675	29.95	20,216.67	4.70
Transportation	675	14.6	9,855.62	2.29
Handling	675	7.79	5,260.70	1.22
Total Variable Cost			417,440.16	96.96
Fixed Costs (FC)				
Cost of rent on store			1,583.33	0.37
Tax			11,500.00	2.67
Total Fixed Costs (TFC)			13,083.33	3.04
Total Costs (TC)			430,523.50	
Total revenue			479,390.83	
Value Added (VA)			61,950.67	

Source: Field Survey, 2015

The results on the costs and returns of input suppliers presented in Table 23 reveal that input supplier incurred total average variable costs of ₦ 417440.16 and total fixed costs of ₦ 13,083.33 per month. Thus an input supplier incurred ₦430,523.5 as the total costs of supplying inputs per month. The results therefore show that variable costs dominated the total costs of inputs supply (96.96%) in the area. This may be because as a result of insufficient finance, the inputs suppliers operate on small scale level which subjected them to procure input at high prices which may reduce the quantity and type of input that could be made available to farmers, increase retail price for input, lead to low demand for input, reduce the profit margin of input suppliers and thus limit their ability to expand such fixed capital as store as such fixed costs constituted only a small portion (3.04 percent) of the total cost.

This result is in consonance with Jonas et al. (2008) who attribute the inability of input suppliers to supply adequate input to insufficient finance in Kenya while stressing that the effect of this is to lock both the input suppliers and the farmers in a viscous circle of poverty. The findings of the study also indicate that an input supplier in the area added an average value of ₦ 61,950.67 per month. Thus by the resultant value added by inputs suppliers, it suffice to say that inputs supply is profitable in the area (Table 25).

4.4.3 Average Costs and Returns of Tomato Processors in the Study Area

The results of the costs and returns analysis of tomato processors are presented in Table 22

The results in Table 22 show that tomato processors in the study area incurred average variable costs of ₦33, 050 per tone. This constituted up to 92.08 percent of the total costs of tomato processing. In addition to the variable costs, tomato processor also

incurred an average total fixed cost of ₦ 2,844.16 per tone which forms only 7.92 percent of the total costs of tomato processing per tone. The Table further revealed that costs of tomato input accounted for 51.26% of the variable cost items while tax paid by the processors explained 0.67 percent of the total costs.

The domination of variable costs over fixed costs may be due to the fact that tomato processing is done using native method which favors the use more variable items and limit the use of fixed capital to Knives, tarpaulin and buckets.

Table 22: Average Costs and Returns of Tomato Processors in the Study Area (naira/tone)

Cultural activities	Quantity	Unit cost	Costs incurred/activity and revenue generated (₦)	Percentage of total cost
Variable costs (VC)				
Costs of tomato	40	460	18,400	51.26
Transportation	40	45	1,800	5.01
Cost of washing	40	78	3,120	8.70
Cost of slicing and spreading	40	75	3,000	8.36
Cost of parking	1	2,355	2,355	6.56
Cost of bags	18	243	4,375	12.19
Total Variable Cost (TVC)	40	75	33,050	92.08
Fixed Costs (FC)				
Depreciation on equipments			804.16	2.24
Cost of rent on store			1,800	5.01
Tax			240	0.67
Total Fixed Costs (TFC)			2,844.16	7.92
Total Costs (TC)			35,894..16	
Total revenue = Qty*price	18	4746.9	85, 444	
Value Added (VA) REV-TVC			52,394	

Source: Field Survey, 2015

This finding is in agreement with the findings of Oluwemimo (2015) and Adeoye *et al.* (2011) who reported 90.88 percent and 98.52 percent as variable cost of producing

vegetable and water melon, respectively. The results also reveal that a tomato processor earned an average value added of ₦ 52,394.00. This signified that tomato processors added some value on tomato and that tomato processing is a profitable (Table 25) venture in the area.

4.4.4 Average Costs and Returns of Tomato Wholesalers in the Study Area

Table 23 presents the average costs and returns associated with tomato wholesaling in the study area.

Table 23: Average Costs and Returns of Tomato Wholesalers' in the Study Area (naira/tone)

Cultural activities	Quantity	Unit cost	Costs incurred /activity and revenue generated (₦)	Percentage of total cost
Variable costs (VC)				
Costs of tomato	40	400	16,000.00	45.38
Transportation	40	65	2,600.00	7.37
Cost of lording	40	23.5	940.00	2.70
Cost of uploading	40	22.32	892.80	2.50
Loss from tomato damage	0.92	650	600.00	1.70
Total Variable Cost (TVC)			21,033.00	59.65
Fixed Costs (FC)				
Cost of rent on store			14,000.00	39.71
Tax			223.89	0.64
Total Fixed Costs (TFC)			14,223.89	40.34
Total Costs (TC)			35,256.89	
Total revenue Qty * unit price	40	650	26,000.00	
Value Added (VA) REV-TVC	26,000	21033	4,967.00	

Source: Field Survey, 2015

The results in Table 23 reveal ₦21, 033 as the total variable cost incurred by tomato wholesaler per tone. Thus, the results show that the variable costs component of

the total costs of tomato wholesaling in the study area explained substantial part (59.65) of the total costs incurred in tomato wholesaling, this could be because tomato wholesalers in the area purchased more of such variable items as tomato, transportation etc. Fixed costs on the other hand explain the remaining 40.34 percent of the total cost of tomato wholesaling in the area.The results further indicated that a tomato wholesaler added an average value of ₦ 4,967 on the commodity, per tone. Thus tomato wholesaling is a profitable venture in the area (Table 25). This finding is in agreement with (Falola *et al.*, 2014 and Okpeke 2014).

4.4.5 Average Costs and Returns of Tomato Retailers in the Study Area

Costs and returns associated with tomato retailing are presented in table 24.

The total cost incurred by tomato retailer was ₦ 21,889.80 per tone while the total average variable costs incurred by a retailer per tone were ₦ 12,199.24. The variable costs dominated the total costs of tomato retailing. This could be attributed to the fact that the fixed costs of tomato retailing is limited to rent and tax only in the study area The total fixed costs of tomato retailing explained the remaining part of the total cost of tomato retailing. Adewuyi and Adekunle (2015) reported 0.01 percent as the fixed cost of tomato retailing in Oyo state. The results further revealed that the average value added on tomato by a retailer per tone was ₦ 7,200.76 signifying that value is added at the retail stage and therefore tomato retailing is profitable in the study area (Table 25)

Table 24: Average Costs and Returns of Tomato Retailers' in the Study Area (naira/tone)

Cultural activities	Quantity	Unit cost	Costs incurred/activity and revenue generated (₦)	Percentage of total
Variable costs (VC)				
Costs of tomato	40	450	18,000.00	82.23
Transportation	40	30	1,200.00	5.48
Cost of lording	40	15	600	2.74
Cost of uploading	40	11	440	2.01
Loss from tomato damage	2.13	450	959.24	4.38
Total Variable Cost (TVC)			12,199.24	96.85
Fixed Costs (FC)				
Cost of rent on store			466.67	2.13
Tax			223.89	1.02
Total Fixed Costs (TFC)			690.56	3.15
Total Costs (TC)			21,889.80	
Total revenue Qty * unit price	40	750	28,400.00	
Total Value Added (TVA) REV-TVC			7,200.76	

Source: Field survey, 2015

4.4.6 Summary of the Average Costs and Returns for Tomato value chain actors

Table 25, presents a summary of the costs and returns of tomato value chain actors in the study area.

The results in Table 25 revealed the revenue, costs and value added at each of the identified stages of value addition on tomato in the study area. Tomato farmers incurred a total cost of ₦ 155,800/ha, added a value of ₦ 58,140/ha.

Table 25: Summary of the Average Costs and Returns of Tomato Value Chain Actors in the Study Area

Actors	Revenue	Total costs	Value added
Farmer	205,600.00	155,800.00	58,140.00
Input supplier	479,390.83	430,523.50	61,950.67
Processors	85,444.00	35,894.16	52,394.00
Wholesaler	26,000.00	35,256.89	4,967.00
Retailers	28,400.00	21,889.80	7,200.76
Total	824,834.83	679,364.35	184,651.67

Source: Field survey, 2015

Comparing these results with the findings of Abimbola (2014) that tomato farmer in Osun state Nigeria received an average gross margin of ₦ 72,905.80 and ₦ 3,229.45 without and with tomato losses respectively, revealed that value added by tomato farmers in the study area (₦58,140) is less than that of the tomato farmers in Osun State (72,905.80) therefore, there is need for farmers to improve their value addition activities so as to add more value along tomato value chain. Input suppliers incurred ₦ 430,523.50 as the total costs of supplying agro-inputs, added a value of ₦ 61,950.00.

The Table further indicates that tomato processors incurred total costs of ₦ 35,894.16 and added an average value added of ₦52, 394. Furo *et al*., (2011) reported a gross margin of ₦ 2,180.00 for tomato processing in Adamawa State; therefore tomato processors in the area of this study added more value (₦52, 394) on tomato than their counterparts in Adamawa State. Thus value added by tomato processors in the study area is attractive.

Tomato wholesalers incurred total costs of₦ 35,256.89 and average value added of ₦4, 967 in the study area. Shehu and Mohammed (2017) reported 310.095 as the gross

margin obtained by tomato marketers in Illorin, Kwara State. Comparing these results, it is clear that value added by tomato wholesalers is lower than the value realized by tomato marketers in Illorin, thus there is need for tomato wholesalers to add more value on tomato in the study area (Table 25)

Tomato retailers on the other hand incurred total costs of ₦21, 889.80 and added an average value of ₦ 7,200.76 per ton. The average value added (₦ 7,200.76) by tomato retailers in the area is higher than the average gross margin (₦3, 798) received by tomato retailers in Osun State as reported by Adejobi *et al*., (2011). However when the results are compared with the findings of Haruna *et al.*, (2012) who reported ₦11, 400 as the margin realized by tomato marketers per ton in Bauchi State, it is evident that retailers in the study area stand the opportunities to add more value to tomato. The results of the analysis of variance presented in Table 26 further revealed the differences between the mean values added by the value chain actors in the study area.

Table 26: Results of the Analysis of Variance

		Sum of Squares	Df	Mean Square	F	Sig.
Value added	Between Groups	44585069.29	4	11146267.32	51.471	.000
	Within Groups	93767948.95	433	216554.155		
	Total	138353018.2	437			

The results of ANOVA for the value added by the tomato value chain actors (tomato farmers, input suppliers, processors, wholesalers and retailers) revealed that there is significant differences between the value added by the actors at all the stages of the tomato value chain. Therefore the null hypothesis is rejected and the alternate hypothesis accepted. The implication of this is that there are significant differences in the mean value added among the value chain actors in the study area. To further ascertain the level of significant differences between the mean value added by the value chain actors as

revealed by the results of ANOVA, a post hoc test which is a procedure usually employed to identify the sample means that are significantly different from each other is presented in Table 27

Table 27: Results of Post Hoc Test

		Mean Difference	Std. Error	Sig.
Farmers	Input suppliers	-504.75577*	69.97999	.000
Farmers	Processors	-293.81385*	67.99833	.000
Farmers	Wholesalers	338.6137*	76.03012	.000
Farmers	Retailers	370.71604*	59.29312	.000
Input suppliers	Processors	210.94192*	79.30208	.000
Input suppliers	Wholesalers	843.11713*	86.28804	.000
Input suppliers	Retailers	875.47180*	71.97723	.000
Processors	Wholesalers	632.17521*	84.68884	.000
Processors	Retailers	664.52988*	70.05208	.000
Wholesalers	Retailers	32.35467*	77.234	.000

The mean differences are significant 1% level.

The results of the post hoc test revealed that the mean value added by tomato farmers (₦ 58,140, table 25) significantly ($p< 0.00$) differs from the mean value added by input suppliers, tomato processors, wholesalers and retailers with a mean differences of ₦ -504.76, ₦ -293.81, ₦ 338.16 and ₦ 370.72, respectively. The results further revealed that the mean value added by input suppliers (₦ 61,950.67) significantly ($p< 0.00$) differed from the mean value added by processors, wholesalers and retailers with a mean differences of ₦ 210.94, ₦ 843.12 and ₦ 875.47, respectively. The mean value added by processors (₦ 52,393) significantly ($p< 0.00$) differed from that of wholesalers and retailers with a mean difference of ₦ 632.18 and ₦ 664.53 respectively.

Further review of the results revealed that the mean value added by wholesalers (₦ 4,967) significantly ($p< 0.00$) differed from the mean value added by retailers with a

mean difference of ₦ 32.35.Therefore this can be concluded that there is significant differences in the value added among the value chain actors in the study area.

4.5 Socio-economic Factors Affecting Value Addition among Tomato Value Chain Actors in the Study Area

Multiple regression analysis was employed to estimate the relationship between value added on tomato at each stage of the identified levels of value addition chain (the dependant variable) and the socio-economic characteristics of the value addition actors in the study area (the explanatory variables). The explanatory variables included in the model were age; land size; labour; Marital status; household size; level of education; years of experience,; quantity of input; Quantity of tomato processed; Access to markets and Quantity of tomato handled.

4.5.1 Factors Affecting Value Addition among Tomato Value Chain Actors

The results of the linear model of the multiple regression analysis for the relationship between value chain actors' socio-economic characteristics and their Value addition on tomato are presented in Table 28.

The results reveal that R^2- value was 81.50, 92.70, 94.40, 94.40 and 80.20 percent of the variation in value addition by input suppliers, tomato farmers, processors, wholesalers and retailers is accounted for by the explanatory variables included in the models. The significance of F- value at one percent attests to the presence of significant relationship between the dependant and the explanatory variables, implying that up to 81.50, 92, 94.40, 94.40 and 80.20 percent of the variation in value addition by the actors is accounted for by the explanatory variables included in the model. The significance of F- value at one percent attests to the presence of significant relationship between the

dependant and the explanatory variables. Value addition on tomato by tomato farmers (the dependant variable) is explained by age, land size, labour, household size, level of education, experience, quantity of fertilizer, access to markets and quantity of tomato.

Table28: Results of the regression analysis on the socioeconomic factors that determine value addition in tomato Farming, Input supply, Tomato Processing, Tomato Wholesaling and Tomato Retailing

Variable	Input supplier		Tomato farming		Processors		Wholesaler		Retailers	
	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t- ratio	Coefficient	t- ratio
Constant (α)	-731889.457 (169574.330)	-4.316***	-510577.150 (98086.001)	-5.205**	-1309662.629 (151987.096)	-8.617***	-1588461.377 (131252.643)	-4.483***	198337.307 (141472.994)	-1.402***
Age	2476.761 (1207.9205)	2.050**	1605.869 (925.429)	1.735*	4611.726 (1727.204)	2.670**	1467.124 (635.171)	2.310**	2299.792 (848.485)	2.710***
Land size	_	_	43936.255 (9602.963)	4.575***	_	_	_	_	_	_
Labour	_	_	717.543 (279.731)	2.565**	_	_	_	_	_	_
Household size	4548.965 (2395.298)	1.899*	14763.586 (2657.270)	5.556***	49559.596 (15015.099)	3.301***	6796.750 (1582.008)	4.296***	5482.707 (2711.751)	2.022**
Education	43880.265 (23758.888)	1.847*	47379.294 (10868.315)	4.359***	140744.522 (41732.267)	3.373***	47854.847 (19899.371)	2.405**	10276.590 (31313.233)	3.282***
Experience	10820.150 (2814.905)	3.844***	4258.912 (1670.407)	2.550**	17693.899 (55107.733)	3.646***	22015.369 (6248.371)	3.523***	13432.124 (7293.842)	1.842**
Fertilizer	_	_	59210.268 (34511.114)	1.716*	_	_	_	_	_	_
Cost of inputs	.001 (.000)	-1.431	_	_	-.138 (085)	-1.629	-.005 (.003)	-1.740*	.015 (.028)	.535
Access to markets	118476.851 (33917.489)	3.493***	21184.308 (6502.814)	3.258***	55056.920 (19150.691)	2.875***	44325.487 (12160..339)	3.645***	35417.592 (14724.715)	2.405**
Quantity handled	1345.175 (507.929)	2.648**	404.436 (42.367)	9546***	755.751 (289.572)	2.610**	3.259 (.789)	4.147***	4.245 (1.604)	2.646***
R^2	81.50		92.70		94.40		94.40		80.20	
F	36.538		174.438		153.229		153.229		61.267	

*** = significant at one percent, **= five percent, *= ten percent

Age of the value chain actors: The coefficient (2476.761, 1605.869, 4611.726, 1467.124 and 2299.792) for the age of input suppliers, tomato farmers, processors, wholesalers and retailers (actors) respectively, is positive and significant ($p<0.085$, $p<0.045$, $p<0.010$, $p<0.026$ and $p<0.008$) respectively, meaning that increase in the age of the value chain actor influence value addition positively. The results show that increase in the age of an actor by one year increases value addition of the input suppliers, tomato farmers, processors, wholesalers and retailers by 2476.761, ₦ 1,605.869, ₦ 4611.726, ₦ 1467.124 and ₦ 2299.792, respectively. This may be because of the fact that older actors may be more familiar with activities along the value chain as a result of their exposure in the business.

This result corroborate the findings of Ugwuja *et al*. (2011) who found out that age of tomato farmers positively and significantly affect their demand for fertilizers. Angelina (2014) also reported older tomato farmers to produce between medium to high tomato productivity levels while stressing that age of farmers positively influenced tomato productivity and the relationship between age of tomato farmers and their tomato productivity was statistically significant. On the contrary Adewuye and Adekunle (2015) found out that older age reduce retailers' profit in Oyo State.

Land size: Production activities takes place on land which means that land support production and therefore its size contributes to the size of production. The coefficient (43936.255) of land size is significant ($p<.000$) the result implied that other things being equal, increase in farm size by one hectare will increase tomato farmers' value addition by ₦ 43,936.255 per hectare. Therefore the size of farm used in tomato farming by the farmers is an important factor that determines the quantity of productive

input to be employed by the farmer, the possible quantity of tomato output, the size of farmers' income and the farmers' standard of living. Larger farm holdings also help the farmer to save cost and time needed for farm operations through the use of modern technologies as machineries, insecticides and so on.

This is in line with Yusuf *et al.,* (2016) who reported that an increase in size of farm holdings by one hectare will increase the income of rain fed rice farmers by ₦61, 319.60 and Oluwemimo (2015) who found out that the size of land committed to tomato farming determines level of output and thus determine profit. Stressing that land therefore impacts positively and significantly on the farmers' net income to the extent that a unit increases in farm size will lead to 52% increase in tomato farmers' net income. Ogunniyi and Oladejo (2011) found out that the variability in technical efficiency of tomato farmers was due to changes in the hectares used for tomato farming during the season.

Labour: the coefficient (717.543) of labour variable is as expected. It had positive sign and statistically significant ($p<.012$). The implication of this finding is that labour input has sinificant relationship with value addition by farmers. Thus, a unit (man-day) increase in size of labour input will increase tomato farmers' value addition by ₦ 717.543 per hectare. Therefore, it is obvious that labour supply in tomato value addition is of paramount significance. This results is in agreement with the findings of Ademuluyi *et al.* (2014) who reported that labour input has direct relationship with gari processing in Langtan south local government area of plateau state. Ume *et al.,* (2014) also reported that increase in labour input will increase the output of gari farmers. The output of watermelon producers will increase as the level of labour input increases (Adeoye *et al.,* 2011) Hired labour input contribute positively to farm productivity in the dry savanna

and humid forest agro-ecological zones of Nigeria (Ajibefun *et al.*, 2002; Ajibefun and Abdulkadir 2004; Adebayo, 2006 and Ogudele and Okoruwa, 2006)

Household size: The estimated coefficient (4548.965, 14763.586, 49559.596, 6796.750 and 5482.707) of the household size variable for the actors respectively, showed a positive and significant ($p<0.000$, $p<0.000$, $p<0.063$, $p<0.002$, $p<0.000$ and $p<0.046$) relationship between value addition on tomato by the actors and the number of productive members available in the family. The results connote that an increase in the size of tomato actors' household size by a member increases labour supply to the family which in turn increases level of value addition by ₦4548.965, ₦14, 763.586, ₦ 49559.596, ₦ 6796.750 and ₦ 5482.707 per hectare. Other things being equal the larger the number of members in a given family, the higher the probability for that family to add more value on tomato, sale more tomato, receive more income and thus more value from their value addition activities. An increase in the quantity of labour input will increase the quantity of output. The results on the household size are supported by Kassu (2009) who reported that input demand and supply is influenced by the size of active labour force of a family.

The results are also supported by the findings of Angelina (2014) who reported that the level of tomato productivity is affected by the number of members in a house hold. Tomato farmers with more family members produced more tomato per hectare in the study area. Labour is one of the major determinants of output in production activities (Ibrahim and Omotesho 2009). Sanusi and Dada (2016) who reported that more family labour is employed in conducting tomato marketing in Ogun State Nigeria while stressing that household income positively influenced tomato marketing margin in the study area.

Odufa *et al.* (2016) reported that large house hold size as well as availability of family labour in conducting the activities of tomato marketing is of great importance while stressing that family labour helps in sustaining small scale business in Ogun state Nigeria. Large household size could serve as a ready source of cheap labour in operating a business (Gona and Mohammed 2009)

Level of education: The coefficients (43880.265, 47379.294, 140744.522, 47854.847 and 10276.590) for the level of education variable for the actors is positive and significant ($p<.070$, $p<.000$, $p<.001$, $p<.020$ and $p<.001$), respectively. The results revealed that education is an important factor influencing value addition on tomato in the study area. It connotes that each additional year spent to acquire education improved actors value addition by ₦ 43880.265, ₦ 47,379.294, ₦ 140744.522, ₦ 47854.847 and ₦ 10276.590. Increased in level of education helps actors to adopt modern technologies which aid them to increase the quantity, quality and hence value of their tomato outputs. The resultant increased in the value of their outputs will lead to an increased income to the actors and thus improve their standard of living.

Further the results on the level of education are supported by Ahmad *et al.,* (2012) increase in level of education increases the level of adoption of protected tomato practices. Increasing educational levels positively and significantly influences the demand for such improve technologies as fertilizers (ugwuja, *et al.,* 2011) additional number of years spent in school help farmers adopt modern technologies that brings about increased output which in turn lead to increased income to the farmers and thus help them fight poverty (Joseph *et al.,* 2013). The more farmers become more educated, technical inefficiency is reduced (Orefi *et al.,* 2011) Adejobi *et al.,* (2011) reported that

higher level of literacy is needed in trade because it enhances the marketers' managerial ability and their level of intuitive reasoning.

Experience: Number of years spent on farming or any other production activity is expected to affect the output positively. The coefficients (10,820.150, 4258.912, 17,693.899, 22015.369 and 13432.124) for actors experience in value addition activities is positive and significant ($p<0.000$ $p<.012$, $p<0.001$, $p<0.001$ and $p<0.068$) the result indicated that increase in number of years spent in conducting value addition on tomato has direct relationship with the actors' value addition. The value of the coefficients connote that an increase in the time spent in the business of value addition on tomato by one year increased the actor's ability in tomato value addition by ₦ 10,820.150, ₦ 4,258.912, per hectare ₦ 17,693.899, ₦ 22,015.369 and ₦ 13,432.124. Experience as an important factor could aid actors to avoid costly mistakes that could lead to reduction in quantity and value of output. Ibitoye *et al.,* (2015) reported that increase experience among tomato farmers is associated with high level of efficiency in Kogo State.

The results on actors' experience are also in agreement with the findings of Olowa and Olowa (2014) who reported that increased experience lead to possession of necessary farming skills for increased productivity and efficiency Increased in years of experience is associated with increase in farm income (Joseph *et al.*, 2013) Experience is necessary to succeed in tomato trading because one needs to understand the market before coming into the business (Adejobi *et al.,* 2011) Improvement in processing experience of Fufu processors could potentially lead to technical efficiency (Adeniyi and Olufonmilola 2014). It also agrees with Sanusi and Dada (2016) who reported that level of experience in marketing relate positively with output of marketing while stressing that

a year increase in marketing experience lead to increase in marketing margin by ₦ 0.01in Odeda local government.

Quantity of fertilizer: increase in the quantity of fertilizer used by tomato producers is expected to relate positively and significantly with the quantity of output. As expected, the coefficient (59210.268) for the quantity of fertilizer is positive and significant ($p<0.089$). By implication, the results show that an increase in the quantity of fertilizer used in tomato farming by one bag will increase tomato output and hence increase farmers' income by ₦ 59,210.268 kobo. Ugwuja *et al*., (2011) reported that increase in the quantity of fertilizer used by farmer lead to enhance yield and productivity in Ekiti State. Daniel and Amaziye, (2014) reported that a unit increase in the quantity of land, cassava cuttings, fertilizers and transport in cassava production will lead to increase in cassava output by 20, 22, 16 and 30 percent respectively in the study area.

Access to markets: Number of markets accessible to actors is expected to affect value addition positively. The coefficient (118476.851, 21184.308, 55056.920, 44325.487 and 35417.592) for access to markets by the actors is positive and statistically significant ($p<0.001$, $p<0.001$, $p<0.005$, $p<0.001$ and $p<0.018$) respectively, the result indicated that increase in the value chain actor's access to market has direct relationship with their value addition. The value of the coefficients connote that an increase in the number of time a tomato farmer access market increased the actor's ability in tomato value addition by ₦ 118476.851, ₦ 21,184.308, ₦ 55056.920, ₦ 44325.487 and ₦ 35417.592. Accessibility to markets as an important factor that could aid actors to avoid low price as a results of the accessibility of alternative markets, reduce time lag between

production and marketing and hence reduce tomato spoilage thereby increasing the value of local tomato production.

The results on actors access to markets is supported by IFAD (2011) who reported that access to market as one of the vital steps to increasing Agricultural productivity, generating economic growth and reducing hunger and poverty thereby strengthening food security in the rural areas. Improved access to both local and international markets opportune small scale producers to reliably sell their output at reasonable prices which in turn encourage them to invest and increase the quantity, quality and diversity of their output. Adejobi *et al*., (2011) reported that the increased tomato farming in Nigeria is not able to increase household access to fresh tomato because of markets related factors. Balogun (2011) reported that as a result of poor access to market in Aja'ba and oje in Ibadan, Nigeria, vehicles find it difficult to lord and off-lord goods thereby causing unnecessary delays which lead to loss of goods, reduction in value of the goods and hence reduced market participants income. The study recommends upgrading the existing roads so as to improve the markets accessibility.

Quantity of tomato produced: increase in the quantity of tomato produced by the farmer is expected to relate positively and significantly with farmer's value addition. As expected, the coefficient (1345.175, 404.436, 755.751, 3.259 and 4.245) for the quantity of quantity of commodity handled by actors is positive and significant ($p<0.000$, $p<0.000$, $p<0.000$, $p<0.000$ and $p<0.000$) respectively. By implication, the result showed that other things being equal, a unit increase in the quantity of commodity handled will increase actor's value addition by ₦ 1345.175, ₦ 404.436, ₦ 755.751 ₦ 3.259 and ₦ 4.245. Therefore increased tomato output leads to increase in the actors' income.

This result is in line with the findings of Haruna *et al*., (2012) reported the significant roles played by tomato wholesalers in value addition on tomato to include renting of tall in urban areas buying tomato from farmers and other traders, storing the commodity and financing the exchange procedures among other activities. The study further stressed that farmers who are able to sell their tomato produce directly to wholesalers have better opportunity of receiving higher prices than those who disposed their produce to local traders which in turn this opportune them to handle and/or produce more of the commodity.

The findings on the influence of socio-economic characteristics of the value chain actors on their Value addition revealed that significant relationship existed between actors' socio-economic characteristics and their value addition throughout the value chain in the study area. The influence of socio-economic characteristics on tomato farmers' value addition is shown in Table 28. The result revealed that Age, Land size, Labour, Household size, level of education, Experience, Quantity of fertilizer, Access market and Quantity of tomato produced respectively significantly influenced tomato farmer's value addition. The findings in Table 29 further show that Age, Household size, level of education, Experience, Access market and Quantity of input supplied respectively, significantly impact on value addition by input suppliers. The results presented in Table 30 revealed that that Age, Household size, level of education, Experience, Access to market and Quantity of tomato processed respectively, had significant impact on value addition on tomato by the processors.

The findings of this study show in Table 31 reveal that Age, Household size, level of education, Experience, Cost of wholesaling, Access to market and Quantity of tomato

sold respectively, significantly related with wholesalers value addition on tomato. Results on retailers' socio-economic characteristics presented in table 32 shown that Age, Household size, level of education, Experience, Access to market and Quantity of tomato sold respectively, had significant influence on tomato retailers' value addition. Therefore the null hypothesis that there is no significant relationship between socio-economic characteristics of tomato value adders and their value addition on tomato in the study area is rejected. The implication is that socio-economic characteristics of the tomato value chain actors affect value addition on tomato significantly in the study area.

4.6.0 Institutional Factors Affecting Value Addition among Tomato Value Chain Actors in the Study Area

The study used binary logistic regression model to examine the influence of institutional factors (the explanatory variables) on actors' decision to either add value on tomato for sale or for both sale and consumption. Such institutional factors as access to credit, access to mass media, access to extension services, access to market information and membership of a cooperative society were regressed against tomato value chain actors' decision to add value on tomato to examine the effect. It is noted that positive sign on a variable estimates means that high value of the variable increases the likelihood of adding value on tomato for sale and consumption, equally, a variable with negative coefficient signified that high value of the coefficient would reduce the likelihood that an actor adds value on tomato for sale and consumption. The results of the logit regression analysis for the value chain actors (tomato farmers, input suppliers, processors, wholesalers and retailers) were presented in tables 33.

4.6.1 Institutional factors affecting value addition among tomato Value Chain Actors in the study area

The results on the influence of institutional factors on tomato farmers' decision to add value on tomato either for consumption or for consumption and sale presented in Table 33 revealed that access to extension services, access to market information and membership of a cooperative society had positive influence on tomato farmers' decision on tomato value addition. These variables were statistically significant at 5 percent probability level. The results of the Nagelkerke R^2 shows that up to 85, 91, 88, 53 and 87 percent of the variation in the decision on value addition by the actors was as a result of the independent variables in the models. The Omnibus test of model coefficient (which gives the overall fit-test for the model) revealed chi-square values of 66.199, 148.774 70.848, 22.044 and 117.712 which are significant ($P< .000$) implied that the employed model fit significantly.

Table 29: Results of the Logit Model on the Institutional Factors Affecting Value Addition in Tomato Farming, Input supply, Processing, Wholesaling and Retailing

	Input suppliers			Farmers			Processors			wholesalers			retailers		
Variable	Coefficient	Z	Exp (B)	Coefficient	Z	Exp (B)	Coefficient	Z	Exp (B)	Coefficient	Z	Exp (B)	Coefficient	Z	Exp (B)
Constant	**-3.392**	**10.630*** **	**0.034**	**-4.580**	**15.443*** **	**.010**	**-5.796**	**4.922** **	**.003**	**-2.709**	**5.536* ***	**.067**	**-2.649**	**20.690**	**.071**
	(1.040)			**(1.165)**			**(2.613)**			**(1.152)**			**(.582)**		
Access to credit	**1.777**	**.000**	**5.914**	**.125**	**.550**	**1.133**	**.125**	**.455**	**1.133**	**.132**	**2.453**	**1.114**	**.391**	**6.615** **	**1.478**
	(612.237)			**(.169)**			**(.185)**			**(.084)**			**(.152)**		
Access to mass media	**1.523**	**6.267** **	**4.586**	**.523**	**1.601**	**1.687**	**.777 (.406)**	**3.674** **	**2.176**	**.522**	**4.251* ***	**1.686**	**3.853**	**.000**	**47.135**
	(.608)			**(.413)**						**(.253)**			**(1441.330)**		
Access to extension services	**_**	**_**	**_**	**3.938**	**6.540** **	**51.325**	**_**	**_**	**_**	**_**	**3.006**	**5.467**	**_**	**3.555**	**12.994**
				(1.540)											
Access to market information	**2.885**	**3.817** **	**17.897**	**2.279**	**3.183** **	**9.769**	**3.221**	**5.522** **	**25.053**	**1.699**	**5.885* ***	**9.403**	**2.564**	**3.334** **	**7.058**
	(1.476)			**(1.278)**			**(1.371)**			**(.980)**			**(1.360)**		
Membership of a cooperative society	**3.175**	**4.854**	**23.931**	**3.548**	**8.247*** **	**34.757**	**3.342**	**2.034**	**28.286**	**2.242**	**5.885* ***	**9.403**	**1.954**	**3.334** **	**7.058**
	(1.441)			**(1.236)**			**(2.343)**			**(.924)**			**(1.070)**		
-2 log likelihood	**22.304**			**27.198**			**17.784**			**31.619**			**3.5235**		
Nagelkerke R^2	**.858*** **			**.917**			**.884**			**.537**			**.872**		
Omnibus statistic	**66.199*** **			**148.774*** **			**70.848*** **			**22.044 *** **			**117.712*** **		

***=significant at one percent, **=five percent, *=ten percent

Access to credit: the coefficient (0.391) for access to credit had positive influence on retailer's decision on value addition. The relationship is significant (P<.010) the result implied that provision of credit to tomato retailers increases the actor's log odd of value on tomato for consumption and for sale by 1.478 times higher than the probability of adding value on the commodity for consumption only. This could be because of the fact that provision of credit to retailers empowered them to purchase more tomato and improve the quality of tomato retailing services which results in the supply of more attractive and acceptable tomato by the consumers.

Access to Mass Media: The results in Table 34 revealed that the coefficients (1.523, 0.777 and 0.522) for access to mass media had positive and significant (p<0.012, p<0.055 and p<0.039) influence on input supplier's; processor's and wholesaler's decision on value addition. Meaning that increased access to mass media by input suppliers increase the input suppliers' log odds of value addition for both consumption and sale by 4.586, 1.686 and 2.176 respectively.. This may be attributable to the relevance of mass media as one of the effective means of disseminating information to the value chain actors. This finding is supported by Mariam *et al*., (2013) who found out that up to 75 percent of the respondent received information on input supply and distribution through the mass media. Angelina (2014) found out the existence of positive relationship between exposure to mass media and tomato productivity in Tanzania.

Access to extension services: access to extension services (3.938) was found to have positive and significant (P< .011) influence on tomato farmer's decision on value addition meaning that access to extension services increases the chances of a tomato farmer adding value on tomato for sale and consumption. The result implied that

additional access to extension services increases the farmer's log odds of adding value on tomato for sale and consumption by 51.325, meaning that increase in tomato farmer contact with extension services, increases the farmer's decision to add value on tomato for sale and consumption. This finding is supported by the findings of Phatela and Ajuruchukwu (2015) who found out that delivery of extension services to farmer influences the farmer's main reason to produce vegetable for sales and consumption. Similarly Angelina (2015) reported that increased access to extension services resulted in remarkable increase in tomato productivity.

Access to market information: The results in the Table (33) further show that the coefficients (2.885, 2.279, 3.221, 1.699 and 2.564) for access to market information influenced actors decision on value addition positively and significantly ($p< 0.074$, $p< 0.019$, $p< 0.083$ and $p< 0.059$) the implication of this results is that as actors' access market information they become more aware about the tomato markets demand and supply condition and thus assist them to decide the time and the markets to be supplied. Thus access to market information reduces the chances of the value chain actors to face market related problems. The result revealed that access to market information increases actors' log Odd of value addition on tomato value chain for sale and consumption by 17.897, 9.769, 25.053, 5.467 and 12.994 by input suppliers, farmers, processors, wholesalers and retailers respectively.

This finding is supported by Jonas *et al*., (2008) who reported lack of market information as one of the major constraints for agro-input dealers in Western Kenya; Mariam *et al*., (2013) who found out that majority of the respondent received information on input supply and distribution through the mass media; Ugunna (2015) who reported

that absence of good market information as major constraint affecting tomato value chain in Nigeria and DAFF (2012) who reported that availability of reliable market information is essential for producers to reduce marketing risks, decide which market to supply and decide the need for produce diversification thereby participate competitively in the markets.

Membership of a cooperative society: membership of a cooperative society had positive coefficient (3.175, 3.548, 2.242 and 1.954) for input suppliers, farmers, wholesalers and retailers respectively,) the relationship is significant (P<.028, P<.004, P<.015, and P<.068). The coefficient shows that membership of a cooperative society increases the farmer's log odds of adding value on tomato for sale and consumption by 23.931, 34.757, 9.403 and 7.058. This implied that as the value chain actor becomes a member of an association the likelihood for his decision to add value on tomato value chain for sale and consumption increases. This could be linked to the fact that cooperative societies usually help their members to access agro-input which results in increased tomato output and thus the need to preserve it for household and market consumption. Almaz *et al.*, (2014) found out that membership in a social organization reduces severity of production constraints thereby leading to increased tomato output per farmer.

Also in a study on assessment of infrastructure and productive assets Izuogu (2015) stressed that farmers should be enlightened and encouraged to join Fadama users groups to benefit from various input support programs from government and non-governmental organizations. Oluwemimo (2015) found out that cooperative societies furnish vegetable farmers with in attempt to increase vegetable production in Oyo state.

This finding is in line with that of Ranjan *et al.,* (2013) reported that membership of a self help group assist in bringing people together thereby strengthening and empowering vulnerable community. DAFF (2012) reported that marketing cooperatives assists smallholder producers to accomplish collectively what they cannot achieve individually by enabling them to pool their product together thereby enjoying more bargaining power in the market place.

4.7.1: Level of Tomato Value Chain Fixing

Level of tomato farmers' linkage with stake-holders along tomato value chain is the extent to which tomato farmers are able to interact with participants at the various levels of the value chain. The extent of the interaction revealed the fixity of tomato value chain in the study area. Higher levels of linkages between the actors are preferred. Level of linkage between tomato farmers and other value chain actors is presented in Table 38

Table 30: Level of Linkage between Tomato Farmers and Other Value Chain Actors along Tomato Value Chain in the Study Area

Stakeholders	Very strong linkage		Strong linkage		Weak linkage	
	Freq.	%	Freq.	%	Freq.	%
N=154*	154*					
Input dealers	-	-	-	-	40	29.85
Off-takers	0	0	0	0	0	0
Financial institutions	-	-	-	-	64	47.76
Extension workers	-	-	-	-	42	31.34
Ministry of Agriculture	-	-	-	-	8	5.97
Total	-	-	-	-	154	114.92

No linkage, weak linkage, strong linkage and very strong linkage = 0%, < 50%, 51-69% and 70-100% respectively.

The results in Table 38 revealed that about 48 percent of the tomato farmers had interacted with financial institutions signifying a weak linkage. This implied that though farmers' linkage with financial institutions was weak, yet some of them had some access to financial support to improve tomato production activities and hence increase tomato production in the study area. The results in Table 33 also confirmed that tomato farmers in the area accessed some financial support. Even though the results exhibits positive relationship between farmers and financial institutions, yet there is need to encourage formal financial institutions to increase credit allocation to tomato farmers because amount given is not adequate and many of the farmers accessed financial support from informal financial institutions. This results is supported by the Bashiru *et al.,* (2014) who found out that the main source of farm investment credit ware the informal sources in the upper west region of Ghana.

The results further show that the level of linkage between farmers and extension workers is a weak one. Only about 31 percent of the farmers had contact with extension workers. This therefore portrayed that tomato farmers in the area had no adequate contact with extension workers which may be as a results of the existing extension worker to farmer ratio of 1 extension worker to 3087 farmers in the study area as against the conventional ratio of 1 to 1000. Thus to improve the level of linkage between farmers and extension workers there is the need to reduce the existing ratio to at least 1 to 1000 farmers. This may increase the number of farmer access to extension workers and may therefore facilitates adoption of improved production practices to increase tomato production in the area. This result is in consonance with the findings of Tariq *et al.,* (2014) who reported that even though extension workers contact with farmers was not

satisfactory yet the little contact that farmers had with the extension workers had resulted in increased tomato production and thus the study concluded that the role of extension agent cannot be overlooked. Equally, Ibitoye *et al.,* (2015) reported that increase in extension workers contact with tomato farmers increased tomato output in Kogi State Nigeria.

The results in Table 35 further revealed that the level of linkage between tomato farmers and input dealers was also weak, only 29 percent of the tomato farmers acquired inputs from the registered input dealers. This implied that most of the farmers procured input from other sources that may not be reliable which may result in reduced tomato production. Jonas et al. (2008) reported low use of inputs by farmers due to market constraints as one of the factors responsible for the gap between potential and actual yield. Abolusoro *et al.*, (2014) reported that improved agro-inputs are necessary for increase tomato production in Kogi State.

The interaction between tomato farmers and Ministry of Agriculture was weak. Only 5.97 percent of the farmers were able to interact with the policy environment to influence policy decisions by government which could lead to increase in tomato production and suggest possible solutions in the study area. Meaning that policy makers do not carry tomato farmers along in making policies that affects tomato production and marketing activities which definitely reduces the success of such policies.

The results (0%) in Table 35 further revealed that tomato farmers had no linkage (0%) with tomato off-takers implying that tomato farmers produced and supply tomato at unattractive price. This practice is most often than not injurious to farmers because at the peak of tomato harvesting season farmers have no option than to take whatever prices

offered to them else they may lose everything. This therefore showed that linkage between farmers and off-takers is essential to increase tomato production and farmers' income. This result is supported by the findings of Abimbola (2014) who reported that as a result of storage problems farmers are forced to take their produce to market which results into glut in the market and thus leading to increase postharvest loses.

The absence of linkage between farmers and off-takers may be attributable to the fact that farmers are not strongly organized. This reduced their ability to pursue marketing of tomato output collectively and thus prevent farmers' from inviting, meeting and signing a memorandum of understanding with tomato off-takers so that they are sure of ready market for their tomato output. Odufa *et al.,* (2016) reported that perishable nature of tomato is among the factors that aggravate the level of lose incurred during tomato marketing and subsequently discourages many farmers from going into large scale tomato production signaled the need to take corrective measures in tomato marketing process. Abimbola (2014) recommended investment in processing technologies in tomato production areas with the view to enable farmers to have direct contact with processors thereby reducing losses incurred by farmers and thus increasing their earnings.

The result of this study also concur with the findings of Sigei *et al*., (2014) who reported that market inaccessibility, under utilization of processing facilities among others as constraints to improving competitiveness in tomato value chain. The study further revealed that contractual agreement between farmers and industrial buyers was weak and this need to be improved and further recommended that government should partner with all stake holders along tomato value chain so as to enhance its performance.

4.8 Problems along Tomato Value Chain in the Study Area

Tomato value chain actors faced several problems. They encountered the problems through their respective efforts to increase the value of tomato at their various level of value addition chain. Some of the problems militating against value addition on tomato in the study area as presented in Table 39 include:

Table 31: Problems Associated with Tomato Value Chain as Reported by the Value Chain Actors in the Study Area

Problem	Farmers		Input supplier		Processors		Wholesaler		Retailer	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Inadequate government support	98	73.13	61	92.42	68	94.44	3	5.76	6	5.26
Insufficient capital	134	100	62	93.93	48	66.67	36	69.23	97	85.09
High costs of inputs	134	100	43	65.15	67	93.05	31	59.62	89	78.07
Poor price	134	100	45	68.18	31	43.05	00	00	00	00
Perishability	134	100	00	00	28	38.88	52	100	114	100
Pests and disease	134	100	00	00	00	00	00	00	00	00
Poor packaging material	124	92.54	00	00	00	00	20	38.82	70	61.40
Poor transport	71	52.99	31	46.96	36	50.00	29	55.77	93	81.58
Inadequate storage facilities	134	100	42	63.63	20	27.77	32	61.54	114	100
Total	1097*	100	2848*	100	298*	100	203*	100	583*	100

Source: Field survey, 2015

Inadequate government support: This constraint is reported by majority of the tomato farmers, input suppliers and tomato processors. The problem become more pronounced mainly because of the frequently changing government policies which most often than not negatively affect the tax payable on imported agro-inputs. The implication of this is to reduce the quantity of imported agro-inputs by decreasing the importers purchasing power, reduced farmers access to improved inputs thereby reducing tomato output; this virtually reduced the value added along the tomato value chain in the area.

Insufficient capital; is reported by all of the tomato farmers and most of the input suppliers, retailers, wholesalers and processors respectively. Signifying that value addition to tomato is a capital intensive venture. Thus value chain actors require good capital base in order to operate the business profitably. Inadequate capital therefore limit the scale at which the actors operate and hence their value addition.

High costs of input: this problem is reported by all of the tomato farmers, majority of processors, retailers, input suppliers and wholesalers respectively. Given a budget outlay, the increasing cost of input has the effect of reducing the quantity of input that can be bought and used by the value chain actors. This reduces the farm size to be cultivated, tomato output and thus the marketable quantities of tomato. High cost of input limits the ability of the input suppliers in the area, to the supply of insufficient quantities of some input needed by tomato farmers while making some improve processing equipments almost inaccessible to the value chain actors. This problem has the strength of causing upward pressure on the consumers' price of this input as a result of shortage in supply.

It also has the affect of lucking tomato processor under the use of local methods. These collectively affect the value added along the value chain negatively. This finding is in agreement with Bongiwe (2013) who reported that the quantity of tomato produced is influenced by the amount of fertilizers applied on the farm. It also conformed to the findings of Adeoye *et al.,* (2011) that inadequate supply of such input as fertilizers and seed are serious constraints of watermelon production in the study area.

Poor price: tomato farmers in the area complained that the price of tomato is too low, more especially at the time of harvest (100%) Majority of the input suppliers' also face this constraint. The low price associated with tomato has negative impact on the farmers' zeal and commitment to tomato farming. The implication of poor price on the farmers is to discourage tomato farming and may encourage tomato farmers to substitute tomato farming with other crops which may in turn reduce tomato supply to the growing consumers.

Tomato Perishability constituted another constraint faced by the value chain actors. The problem was reported by all of the tomato farmers, wholesalers and retailers. This implied that tomato is a highly perishable commodity. Its perishability makes its post harvest handling difficult as such it spoils easily due to inadequate storage and processing facilities in the area. The poor nature of these services in the area compound the problem of tomato perishability there by leading to reduction in the value to be received by the farmer, wholesaler and retailer, in some cases the actor may be push out of business as result of this problem.

Pest and diseases: tomato farmers (100%) reported this as one of the major bottleneck in tomato farming. According to them, pest and diseases of tomato cause a lot of damage to the fruits thereby rendering it useless and unacceptable to the consumers. This therefore means loss to the farmer. Ugonna *et al.*, (2013) reported prevention of pest and diseases of tomato as an extremely important practice in tomato farming.

Poor packaging materials: this problem propels the problem of tomato perishability by causing injury on tomato fruits, thereby speeding up spoilage as the commodity moves through the value chain. Majority of the tomato farmers and retailers attributed problem to basket as the main packaging material for tomato in the study area. Idah *et al.*, (2007) attributed the problem of tomato damage to poor packaging containers while stressing that majority of the actors in the study area regarded basket as an inefficient means of packaging and transporting the commodity.

Poor transportation system: The problems of roads and vehicle used in transporting tomato and agro-inputs bedeviled with tomato value chain actors' efforts in their struggle to add more value on tomato before it gets to the consumer. Majority of the retailers, wholesalers, farmers and processors respectively faced this problem. It devalues tomato as a result of shock and vibration mainly caused by undulated roads and unrefrigerated slow moving Lorries used in transporting the commodity.

Inadequate storage facilities: the perishable nature of tomato makes it storage a major concern to the value chain actors. All of the farmers, retailers and majority of the wholesalers reported this problem. The local tomato storage services in the area are limited to keeping the commodity under trees, hurts, shops and so on. These could not

sufficiently protect tomato from the unfavorable climate. Tomato storage requires adequate supply of electric power, refrigerators and cool roams. The cost nature of these cooling equipments couple with the sporadic electric power supply in the study area, make this service very costly. Thus the effects of this problem are reduction in quantity and quality of tomato that reach the market, increase the cost of supply for tomato and therefore cause increase in the price to be paid by the consumer.

CHAPTER FIVE

5.0: SUMMARY, CONCLUTION AND RECOMMENDATION

5.1: Summary

Despite the level of tomato farming in Africa and Nigeria in particular, the tomato produced in Nigeria has not been able to march the local demand for the highly perishable commodity. Therefore, the local tomato farming is unable to stop Nigeria from its detrimental importation of tomato. The inability of Nigeria to supply sufficient tomato for at least local consumption is made worst by the inherent tomato perishability. Tomato perishability reduces the quantity and quality of the locally produced tomato that reaches the consumers. Therefore reduction in tomato wastage stands as a laudable alternative for increasing the supply, availability access ability and usability of the locally produced tomato.

It is against this backdrop that this study strides to appraise tomato value addition chain in Zamfara State Nigeria. This is done in order to identify the constraints causing the unacceptable reduction in quantity, quality and hence value of the local tomato value chain. The specific problems examined are: socioeconomic characteristics of tomato value addition chain actors, stages of value addition, methods used in value addition, determine costs and returns associated with tomato value chain, socio-economic factors influencing value addition, influence of institutional factors on value addition, level of the value chain fixing and the problems associated with tomato value addition chain in the study area.

To obtain solution for these problems, tomato producing areas in the state, which include Bakura, Bungudu, Gusau, Maru, Talata Mafara and Tsafe Local Government Areas (LGAs), were purposively selected for the study. Six market places were also

purposively selected. A total of 134 tomato farmers, 66 input suppliers, 72 tomato processors, 52 tomato wholesalers and 114 tomato retailers were randomly selected for the study thus a total of 438 actors were used for this study.

Data for this study were collected from both primary and secondary sources. The analytical tools employed to analyze the data for this study were descriptive statistics; Value added model, Multiple Regression analysis and Logistic regression analysis.

The results from the analysis of socio-economic characteristics of tomato value chain actors revealed that Tomato value chain is dominated by middle age actors (31-50 years) in the study area. These age groups represent (80.55%, 74.99%, 72.80%, 70.14% and 63.89 %,) of the tomato processors, wholesalers, retailers, famers and inputs suppliers respectively, in the area. The mean age was 38 years, 41 years, 40 years, 39 years and 36 years for tomato farmers, Input suppliers, Processors, Wholesalers and Retailers respectively, this shows that tomato value chain was dominated by middle age actors in the area.

Tomato value chain activities in the study area ware dominated by male actors at all levels of the value chain (94.23%, 89.55%, 86.84%, 83.33% and 79.17) of the tomato wholesalers, farmers, retailers, input suppliers and processors respectively. Majority of the tomato value chain actors in the study area were married (100%, 94.90%. 90.28%, 88.15% and 57.02%) of the tomato wholesalers, input suppliers, processors, farmers and retailers respectively.

The results further revealed that most (71.15%, 69.44%, 65.79%, 62.12% and 58.95%) of the tomato wholesalers, processors, retailers, farmers and input suppliers respectively had household sizes of 6 to10 members. The mean household size for tomato

farmers, input suppliers, processors wholesaler and retailer was 11 members, 11 members, 9 members, 10 members and 9 members respectively. The result indicates that majority of the value chain actors had undergone non formal education while only (48.49%, 44.44%, 44.03%, 38.46% and 25.44%) of the inputs suppliers, processors, farmers, wholesalers and retailers, respectively had acquired formal education. The results on experience revealed that majority (80.77%, 76.38%, 76.31%, 70.15% and 42.43%) of the tomato wholesalers, processors, retailers, farmers and inputs suppliers respectively, have been actively engaged in tomato value chain for a period of 11-20 years. The mean years of experience was 14 yeasr,23 years, 29 years 24years and 24 years for farmers, input suppliers, processors, wholesalers and retailers, respectively

The study identified five different levels at which value are added on the commodity. These levels include: Tomato farming, inputs supply, processing, wholesaling and retailing. Tomato Methods used to add value on tomato by majority of the farmers and inputs suppliers include the use of improve inputs, processors used sun drying while marketers sort, wash, store and transport tomato..

Farmers in the area incurred ₦155, 800 as the total costs of producing one hectare of tomato and added value of ₦ 58,140 per hectare. Inputs suppliers incurred a total cost of ₦ 430,523.50 for supplying inputs and added a value of ₦ 61,950.67 per month. Tomato processors in the area incurred ₦ 35,894.16 as the total costs of tomato processing and added a value of ₦ 52,394. Wholesalers incurred total costs of ₦ 35,256.89 and added a value of ₦ 4,967 while retailers incurred ₦ 21,889.80 as total cost of retailing tomato and added value of ₦ 7,200 Variable costs formed the major costs at all the stages of the value chain.

On the relationship between value addition by the value chain actors and the socio-economic characteristics of the actors in the study area, the result obtained at tomato farmers' stage indicate that the coefficients for: Age , Land size, Labour, Household size, Level of education , Quantity of fertilizer, Access to market and Quantity of tomato produced significantly (p<.000, p<.000, p<.016, p<.000, p<.000, p<.043, p<.002) influenced value addition on tomato by tomato farmers, respectively. Socio-economic characteristics of inputs suppliers (household size, level of education, experience, Cost of input, access to market and quantity of input supplied had significant (p<.024, p<.001, p<0.031, p<.010, p<0.007, p<0.008) influence, respectively, on value addition by input suppliers. The coefficients for: House hold size is significant (p< .006), Education (p<.054), Experience (p<0.004), Processing facilities (p<0.103) Number of marketers (p<.067) had positive and significant impact on value addition by processors. Wholesalers' socio-economic characteristics (age, household size, level of education, experience, cost of wholesaling, access to market and quantity handled,) significantly influenced their value addition. (p<.026, p<.000, p <.020, p<0.001, p<.032, p<0.001, p< 0.000) respectively, while age of retailers, household size, level of education, experience, access to market and quantity handled (p <.035, p<.007, p <.017, p<0.023, p<0.053, p< 0.054) respectively, significantly affect value addition by retailers in the study area.

Results on the influence of institutional factors on value addition by the value chain actors reveal that access to extension services and membership of a cooperative society influenced tomato farmers' decision to add value on tomato for both sales and consumption value. Increased access to credit, mass media and market information increase the chances of input suppliers' to add value for sales and consumption. Access to

mass media and market information increase the processors' probability to add value for sale and consumption. The probability of wholesalers' decision to add value on tomato for sale and consumption is increased with access to mass media, access to market information and membership of a cooperative society while access to credit, access to market information and membership of a cooperative society: influenced tomato retailer's decision to add value for sale and consumption in the study area.

Results on the level of tomato farmers' linkage with other stake-holder along tomato value chain revealed weak linkage between tomato farmers and financial institutions; extension workers input dealers, policy environment and had no linkage with tomato off-takers in the study area

Some of the problems associated with tomato value addition chain in the study area as reported by the value chain actors were inadequate government support, insufficient capital, cost of input, poor price, tomato perishabilty, poor transport and poor storage system.

5.2 Conclusions

Tomato value chain consisted of tomato farmer, input suppliers, processors, wholesalers and retailers. Even though value is added at all the identified stages of the value chain and that value addition on tomato is profitable in the study area, yet there is need to improve the existing methods for more stable value chain in the area. Socio-economic characteristics of the actors had significant influence on their ability to add value on tomato. The decision of the value chain actors to add value on tomato is influenced by institutional factors while the level of linkage between tomato farmers and the other stakeholders is weak in the study area.

5.3: Recommendations

1 Since the study found out that tomato farmers in the area used such improved agro-inputs as seed, inorganic fertilizers, insecticides and so on and the subsequent findings that cost of inputs affect value addition negatively it is recommended that government should emphasized on establishing indigenous agro-input firms, encourage development of communities based seed production and distribution centers to ease agro-inputs supply.

2 It was found out that tomato processing is done using local method. To curb this threat it is recommended that improve tomato processing technologies should be made available and/or improvise locally and accessible to value chain actors. This may increase value addition along the chain.

3 The results of the study revealed that socio-economic characteristics of the value chain actors influenced value addition on tomato, thus it is recommended that government in collaboration with the cooperative societies and/or all stakeholders in agricultural sector should increase the number of agricultural development programs with a view to improving the value chain actors' socio-economic status in the study area.

4 The results of the study revealed that institutional factors influenced actors' decision on value addition, therefore it is recommended that the cooperative societies should relate with government, process relevant data and make the information accessible to value chain actors via such avenues as extension agents and mass media.

5 Since the level of tomato farmers' linkage with other stakeholder along the value chain is weak, it is recommended that farmers' cooperative society should enhance their activities to ensure that tomato farmers interact adequately with all the stakeholders along the value chain.

6 To reduce the problem of poor price, the value chain actors should organize tomato marketing union to take charge in tomato price determination as well as linking actors with tomato off-takers, in addition to this, the union should put more effort to acquire improve farm produce transportation facilities more especially for perishables like tomato.

7 Since insufficient capital reduced the scale at which the value chain actors operate, it is recommended that government should work with the value chain actors' cooperative society to provide financial support for tomato value addition.

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APPENDICES

APPENDIX 1

DEPARTMENT OF AGRICULTURAL ECONOMICS

FACULTY OF AGRICULTURE

USMANU DANFODIYO UNIVERSITY, SOKOTO

POSTGRADUATE RESEARCH QUESTIONNAIRE FOR

INPUT SUPPLIERS, TOMATO FARMERS, MARKETERS AND PROCESSORRS

TOPIC: VALUE CHAIN ANALYSIS OF TOMATO (Lycopersicon esculentum Mil) IN SELECTED LOCAL GOVERNMENT AREAS of ZAMFARA STATE

QUESTIONNAIRE FOR INPUT SUPPLIERS

TOPIC: ANALYSIS OF AGRO-INPUT SUPPLY IN SOME SELECTED LOCAL GOVERNMENT AREAS OF ZAMFARA STATE NIGERIA

Kindly read each question carefully, tick the appropriate box [] to indicate your correct answers or write your answers where the questions require you to do so. Surely, your answers will only be used for research purpose.

A. PERSONAL DETAILS

1. Age ----------
2. Sex a. male [] b. Female []

4. Local government area ----------

5. Marital status ----------
   a. Married [ ] b. Single [ ] c. Divorced [ ] d. Widowed [ ]
6. Family size ----------
7. Educational attainment

a. Primary ----- b. Secondary----- c. Postsecondary ------ d. Quranic------ e. Adult classes -------

8. Major occupation ----------
9. Other occupation, specify ----------
10. Years of experience in major occupation. ----------

VALUE ADDITION INFORMATION

B. INPUT SUPPLY INFORMATION

11. For how long have you been supplying agro-input (s)? ----------
12. What type(s) of input are you supplying?

a. Farm implement [] b. Seed [] c. Fertilizers [] d. Chemicals [] e. Packaging materials [] F. All above []

13. Where do you source the input? ----------
14. What are your sources of capital?

a. Self [] b. Family [] c. Friends [] d. Money lenders [] e. Banks [] f. Gov't g. All above

15. What are the units of measurement for the input you supply?

a. Kg [] b. Bag [] c. Sachets [] d. Mudu [] e. Liter []

16. What quantities do you supply for each of the input you identified above annually?

(Indicate the purchasing price for each of the inputs)

a. Farm implements no u. price T. sales b. Seed qty u/price T. sales c. Fertilizr qty u. pric T. sale

i Cutlass --- ---- ---- I --- ----- ----- I NPK ------

ii Hand trowel --- ---- ---- ii ----- ii Urea --

iii --- ---- ---- iii ----- iii SSP -

iv --- ---- ---- iv ----- iv --

v --- ---- --- v ----- v --- ----- ----

d. Chemicals qty u. pric T. sales e. Packag matls qty u. price T. sales F. Others qty u. pric T. sales

I herbicides --- ----- ----- I bag --- ----- ----- i --- ----- -----

Ii insecticides --- ----- ----- ii basket --- ----- ----- ii --- ----- -----

Iii --- ----- ----- iii sachet --- ----- ----- iii --- ------ -----

Iv --- ----- ----- iv --- ----- ----- iv --- ----- -----

V --- ----- ----- v --- ----- ----- v --- ----- -----

17. How much do you sell each units of the input you are supplying?

(Indicate quantity sold annually)

a. Farm implements qty u. price T. sales b. Seed qty u/price T. sales c. Fertilizr qty u. sales T. sales

I Cutlass --- ---- ---- I --- ----- ----- I NPK -- - ---- ---

Ii Hand trowel --- ---- ---- ii ----- ii Urea --- ----- ---

Iii --- ---- ---- iii ----- iii SSP -- - ---- ----

iv --- ---- ---- iv ----- iv -- - ----- ----

v --- ---- --- v ----- v --- ----- ----

d. Chemicals qty u. pric T. sales e. Packag matls qty u. price T. sale F. Others qty u. pric T. sales

I herbicides --- ----- ----- I bag --- ----- ----- i --- ----- -----

Ii insecticides --- ----- ----- ii basket --- ----- ----- ii --- ----- -----

Iii --- ----- ----- iii sachet --- ----- ----- iii --- ------ -----

Iv --- ----- ----- iv --- ----- ----- iv --- ----- -----

V --- ----- ----- v --- ----- ----- v --- ----- -----

18. What problems do you encounter along the agro-input supply chain?

a. ---------- f ----------

b. ---------- g ----------

c. ----------h ----------

d. ---------- I ----------

e. ---------- k ----------

C. PRODUCTION INFORMATION

11. How long have you been producing tomato?

a 1-5 yrs [] b 6-10 yrs [] c 11-15 yrs [] d 16-20 yrs [] e 25 yrs and above []

12. Do your sources of inputs include any of the followings?

a Gov't [] b banks [] c cooperative society [] d agro-dealers [] e all of the above [] h others specify ---

---

13. Have you received any form of formal training? a. Yes [ ] b. No [ ]

14. If yes in 13 above, how often are you meeting the extension workers? a weekly [] b twice a week [] c monthly [] d others ----------

15. Ware you introduced to any improved varieties of input(s) such as local and improved varieties of tomato, inorganic fertilizers, insecticides, herbicides? a yes [] b no []

16 What type (s) of tomato varieties have you been planting?

a local variety [] b improved variety [] c all of the above []

17. List the improved varieties introduced to you. i ----------

Ii ---------- iii ----------

Iv ---------- v ----------

18. Do you adopt any of the varieties introduced to you? A yes [ ] b no [ ]

19. If yes in 18 above, list the type of verities of input(s) you have adopted. ----------

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20. If no in 18 above, why did you decided not to adopt? a difficult to use [] b costly [] c risky [] d others ----------

21. What material do you use in packing tomato after harvesting?

a basket [] b carton [] c sac []d all the above [] e others specify

22. What quantities of the following inputs do you use per hacter? (Indicates cost of input)

a inputs	no/qty	c cost/unit	input cost/ha	total cost of input
i land	-------	----------	----------	----------
ii labor	-------	----------	----------	----------
iii seed	-------	----------	----------	----------
iv fertilizers	-------	----------	----------	----------
v herbicides	-------	----------	----------	----------
vi insecticides	-------	----------	----------	----------
vii a basket	-------	----------	----------	----------
viii carton	-------	----------	----------	----------
viii sac	-------	----------	----------	----------
ix handling	-------	----------	----------	----------
x transportation	-------	----------	----------	----------
xi others cost(s) specify -----		----------	----------	----------

xii ------ --------- ---------- ----------
xiii ------ --------- ---------- ----------
ix -------- --------- ---------- ----------
x -------- --------- ---------- ----------

23. Whom do you sale your tomato to?
a wholesalers [] b retailers [] c consumers [] d all of the above
24 Averagely what is the quantity of tomato output per hacter? (Indicate your farm gate and market
Prices for fresh tomato)

Item	unit	qty/ha	farm gate price/unit	tfg sales mkt price/unit	total mkt sales
Tomato	--------	-------	----------	--------	----------

25. Do you process your tomato produce before marketing? a yes [] b no []
26. If a in 25, why do you process tomato? (Tick as many as possible)
a price advantage [] loss reduction [] excess supply of fresh tomato [] high demand [] others []
27 What method do you use for tomato processing? a traditional [] b modern []
28 What are the procedures in processing tomato using the method identified above? ---
---

---
29. Do you receive any formal training in tomato processing? a. Yes [ ] b. No [ ]
30. If yes in 29, how frequent do you meet with the extension worker?
31. How do the training affects your processing activities? ----------
32. Do you receive any financial support? a. Yes [ ] b. No [ ]
33 If yes in32, what are the sources of the support? ----------
---
34 What are the input(s) required for tomato processing? (Indicate quantity and cost of the inputs/unit of tomato input)

Inputs	unit	qty	cost/unit	total cost of inputs
Tomato	-----	----	--------	----------
i				
ii				
iii				
iv				
V				
Vi				
Vii				
Viii				

35. What are the forms of outputs from your processing activities?
a dry tomato [] b tomato powder [] c tomato germ [] d tomato paste [] e others specify
---
36. Do consumers accept processed tomato in large number? a. Yes [ ] b. No [ ]
37. If no in 36 why? ----------
38. What problems do you encounter in tomato processing?

a.----------
b.----------
c ----------
d ----------
e ----------
39. Do you transport your produce for marketing? a yes [] b no []
40. Where do you transport the produce to? a low price mkt [] b medium price mkt c high price mkt []

41. How much does it cost you to transport your commodity to each of the markets?

Cost items	unit cost	km	cost to lp mkt	cost to mp mkt	cost to hp mkt
Transportation					
Lording					
Unlording					
Tax					

42. Do you store tomato before marketing? a yes [] b no []
43. Do you owned the storage facilities? a yes [] b no []
44. How do you store the processed tomato? ----------
45. For how long do you store? a less than 1 month [] b 1 – 3 c [] 4 – 6 [] d 7 - 9 [] e 10 – 12 []
46. How much does it costs to store a unit of tomato per month?

Item	unit of packaging	cost per unit/month	quantity store	total
Storage	----------	----------	----------	------
Repackaging	----------	----------	----------	-------
Shrinkage	----------	----------	----------	-----
Others	----------	----------	----------	-----

47. What is the quantity of processed output per unit of tomato input? (Indicate selling price/unit of processed output)

Forms of output	unit of output	qty per unit tom	unit price	total sales/annum
i dry tomato	----------	----------	----------	----------
ii tomato juice	----------	----------	----------	----------
iii	----------	----------	----------	----------
iv	----------	----------	----------	----------
v	----------	----------	----------	----------

48. What problems do you encounter in tomato storage?
a.----------
b.----------
c ----------
d ----------
e ----------

D. MARKETING INFORMATION: WHOLESELLING

11. How long have you been in tomato wholesaling? ----------
12. What is the minimum capital outlay required to start tomato wholesaling? ----------
13. Do your sources of capital include any of the followings?
a Gov't [] b commercial banks [] c cooperative society [] d money lenders [] e family

f friends [] g all of the above [] h others specify ----------
14. How do you obtain your tomato supply?
a Farmers [] b Retailers [] c Village collectors [] d Other wholesalers [] e All of the above f other sources specify ----------
15. How much do you buy a unit of tomato from each of your sources of supply? (Indicate quantity
Per year from each of the sources)

Sources	unit	quantity	purchase price/unit	total purchase
Farmers	---	---	---	---
Retailers	---	---	---	---
Village collectors	---	---	---	---
Other wholesalers	---	---	---	---

16. What other vegetable crops are marketing? ----------

---

17. How do the marketing of other vegetables affect your capital investment in tomato?

---

18. Do you transport tomato before marketing? a yes [] b no []
19. If yes in 18 above, where do you transport your tomato to? a low price markets [] b medium price markets [] c high price markets [] d others specify ----------
---
20. What is the distance to the market(s) a less than 1km [] b 1 – 5 km []
c 6 – 10 km [] d 11- 15 km [] e 16 km and above []
21. How much does it cost you to transport a unit of tomato to the identified markets above?
(Include handling charges)

Destination	km	unit	quantity	cost/unit	total cost
Low price mkts	---	---	---	---	---
Medium price mkt	---	---	---	---	---
High price mkt	---	---	---	---	---

22. How many of the following practices do you perform before marketing your tomato and what is the cost of each of the operations per unit of tomato? (Indicate total units handled annually)

Practices	unit	total unit	cost/unit	total cost
Sorting	---	---	---	---
Washing	---	---	---	---
Grading	---	---	---	---
Others	---	---	---	---

23. To whom do you sale your tomato supplies?
a consumers [] b retailers [] c other wholesalers [] d all of the above [] e others specify -
---
24. How much do you sale a unit of fresh tomato to each of the categories listed above? (Indicate total units handled annually)

Marketer category	unit	total unit	unit's price	total sales
Consumers	---	---	---	---

Retailers ------ -------- ---------- ----------
Other wholesalers ------ -------- ---------- ----------
Processors ------ ------- ---------- ----------

25. Do you process tomato? a yes [] b no []

26. Which method(s) do you use to process tomato? a traditional method [] b modern method []

27. How do you process tomato using the method identified above? ----------
---
---

28. What are the final products of your tomato processing activities?

a dry tomato [] b tomato powder [] c tomato germ [] d tomato paste [] e others specify

29. What inputs do you use in tomato processing? (Indicate quantity and cost of the inputs/unit of tomato input)

Inputs	unit	qty	cost/unit	total cost of inputs
Ii Tomato				
ii				
iii				
iv				
V				
Vi				
Vii				
Viii				
Ix others				

30 do you store tomato before markeing

---

31. Do you owned storage facilities? a yes [] b no []

32. For how long do you store tomato? a less than 1 month [] b 1 – 3 c [] 4 – 6 []
d 7 - 9 [] e 10 – 12 []

33. How much does it costs you to store a unit of tomato per month?

Item	unit of packaging	cost per unit/month	quantity store	total storage cost
Storage	----------	----------	----------	------
Repackaging	----------	----------	----------	-----
Shrinkage	----------	----------	----------	-----
Others	----------	----------	----------	-----

34. How much do you sale a unit of tomato after storage?

Item	unit	quantity	unit price	total sales

Tomato ------ ---------- ---------- ----------

35. What problems do you encounter in tomato storage?

a. ---------- b ----------

c ---------- d ----------
e ---------- f ----------
g ---------- h ----------
i ---------- j ----------

E. RETAILING INFORMATION

11. How long have you been in tomato retailing? ----------
12. What is the minimum capital outlay required to start tomato retailing? ----------
13. Do your sources of capital include any of the followings?
a Gov't [] b commercial banks [] c cooperative society [] d money lenders [] e family [] f friends []
g all of the above []h others specify ----------
14. How do you obtain your tomato supply?
a farmers [] b other retailers [] c village collectors [] d wholesalers [] e all of the above []
f other sources specify ----------
15. How much do you buy a unit of tomato from each of your sources of supply? (Indicate quantity
Per year from each of the sources)

Sources	unit	quantity	purchase price/unit	total purchase
Farmers	---	---	---	---
Retailers	---	---	---	---
Village collectors	---	---	---	---
Other wholesalers	---	---	---	---

16. What other vegetable crops are marketing? ----------

---

17. How do the marketing of other vegetables affect your capital investment in tomato?

---

18. Do you transport tomato before marketing? a yes [ ] b no [ ]
19. If yes in 18 above, where do you transport your tomato to? a low price markets []
b medium price markets [] c high price markets [] d others specify ----------
---

20. What is the distance to the market(s) a less than 1km [] b 1 – 5 km []
c 6 – 10 km [] d 11- 15 km [] e 16 km and above []
21. How much does it cost you to transport a unit of tomato to the identified markets above?
(Include handling charges)

Destination	km	unit	quantity	cost/unit	total cost
Low price mkts	---	---	---	---	---
Medium price mkt	---	---	---	---	---
High price mkt	---	---	---	---	---

22. How many of the following practices do you perform before marketing your tomato and what is the cost of each of the operations per unit of tomato? (Indicate total units handled annually)

Practices	unit	total unit	cost/unit	total cost
Sorting	------	----------	----------	----------
Washing	-------	----------	----------	----------
Grading	------	----------	----------	----------
Others	------	----------	----------	----------

23. To whom do you sale your tomato supplies?

a consumers [] b retailers [] c other wholesalers [] d all of the above [] e others specify -

---

24. How much do you sale a unit of fresh tomato to each of the categories listed above? (Indicate total units handled annually)

Marketer category	unit	total unit	unit's price	total sales
Consumers	-----	----------	----------	----------
Retailers	------	--------	----------	----------
Other wholesalers	------	--------	----------	----------
Processors	------	-------	----------	----------

25. Do you process tomato? a yes [] b no []

26. Which method(s) do you use to process tomato? a traditional method [] b modern method []

27. How do you process tomato using the method identified above? ----------

---

---

28. What are the final products of your tomato processing activities?

a dry tomato [] b tomato powder [] c tomato germ [] d tomato paste [] e others specify

29. What inputs do you use in tomato processing? (Indicate quantity and cost of the inputs/unit of tomato input)

Inputs	unit	qty	cost/unit	total cost of inputs
Ii Tomato	-----	----	--------	----------
ii				
iii				
iv				
V				
Vi				
Vii				
Viii				
Ix others				

30. Do you store tomato before marketing? a yes [ ] b no[ ]

31. Do you owned storage facilities? a yes [] b no []

32. For how long do you store tomato? a less than 1 month [] b 1 – 3 c [] 4 – 6 []

d 7 - 9 [] e 10 – 12 []

33. How much does it costs you to store a unit of tomato per month?

Item	unit of packaging	cost per unit/month	quantity store	total storage cost
Storage	----------	----------	----------	------
Repackaging	----------	----------	----------	-----
Shrinkage	----------	----------	----------	-----
Others	----------	----------	----------	-----

34. How much do you sale a unit of tomato after storage?

Item	unit	quantity	unit price	total sales
Tomato	------	----------	----------	----------

35. What problems do you encounter in tomato storage?

a. ---------- b ----------

c ---------- d ----------
e ---------- f ----------
g ---------- h ----------
i ---------- j ----------

F PROCESSING INFORMATION

11 How long have you been processing tomato? ----------

12. Have you received any form of formal training? a. Yes [ ] b. No [ ]

13. If yes in 15 above, how often are you meeting the extension workers? a weekly [] b twice a week [] c monthly [] d others ----------

14. How does the training affect your processing activities? ----------

15. Which method(s) do you use to process tomato? a traditional method [] b modern method []

16. How do you process tomato using the method identified above? ----------
---
---

17. What is the minimum capital outlay required to start tomato processing? ----------

18. Do your sources of capital include any of the followings?

a Gov't [] b commercial banks [] c cooperative society [] d money lenders [] e family

f friends [] g all of the above [] h others specify ----------

19. Where do you obtain your tomato supply from?

a Farmers [] b Retailers [] c Village collectors [] d Other wholesalers [] e All of the above f other sources specify ----------

20. How much do you buy a unit of fresh tomato from each of your sources of supply? (Indicate quantity
Per year from each of the sources)

Sources	unit	quantity	purchase price/unit	total purchase
Farmers	---------	----------	----------	----------
Retailers	----------	----------	----------	----------
Village collectors	---------	----------	----------	----------

Wholesalers --- --- ---

21. What inputs do you use in tomato processing? (Indicate quantity and cost of the inputs/unit of input)

Inputs	unit	qty	cost/unit	total cost of inputs
Ii Tomato				
ii				
iii				
iv				
V				
Vi				
Vii				
Viii				
ix others				

22. What are the final products of your tomato processing activities?

a dry tomato [] b tomato powder [] c tomato germ [] d tomato paste [] e others specify

23. What other vegetable crops are you processing? ---

---

24. How does the processing of other vegetables affect your capital investment in tomato?

25. Do you transport tomato before processing? a yes [] b no []

26. If yes in 16 above, where do you transport your tomato from? a farms [] b collection centers [] c markets [] d others specify ---

---

27. What is the distance from any of the places identified above to your processing house?

a less than 1km [] b 1 – 5 km [] c 6 – 10 km [] d 11- 15 km [] e 16 km and above []

28. How much does it cost you to transport a unit of fresh tomato from the places identified above to your processing house? (Indicate quantity handled annually)

Destination	unit	quantity	cost/unit	total cost
Farms				
Collection centers				
Markets				

29. How many of the following practices do you perform before and after processing your tomato and what is the cost of each of the operations per unit of tomato? (Indicate total units handled annually)

Practices	unit	total unit	cost/unit	total cost
Sorting				
Washing				
Grading				
Others				

30. To whom do you sale your processed tomato?

a consumers [] b retailers [] c other wholesalers [] d all of the above [] e others specify -
---

31. How much do you sale a unit of processed tomato to each of the categories listed above? (Indicate total units handled annually)

Marketer category	unit	total unit	unit's price	total sales
Consumers	-----	----------	----------	----------
Retailers	------	--------	----------	----------
Other wholesalers	------	--------	----------	----------
Other processors	------	-------	----------	----------

32. Do you store tomato before marketing? a yes [ ] b no[ ]

---

33. Do you owned storage facilities? a yes [] b no []

34. For how long do you store tomato? a less than 1 month [] b 1 – 3 c [] 4 – 6 []

d 7 - 9 [] e 10 – 12 []

35. How much does it costs you to store a unit of tomato per month?

Item	unit of packaging	storage cost/ unit/month	quantity store	total storage cost
Storage	----------	----------	----------	------
Repackaging	----------	----------	----------	-----
Shrinkage	----------	----------	----------	-----
Others	----------	----------	----------	-----

36. How much do you sale a unit of processed tomato after storage?

Item	unit	quantity	unit price	total sales
Tomato	------	----------	----------	----------

37. What problems do you encounter in tomato processing?

a. ---------- b ----------

c ---------- d ----------
e ---------- f ----------
g ---------- h ----------
i ---------- j ----------

SECTION B: INSTITUTIONAL FACTORS

1: Is there an organized tomato marketing system?

i) Yes 2) No ( )

ii: If yes are you able to access the organized system?

i) Yes ( ) No ( )

3: Where do you sell your tomatoes?

i) In the farm

ii) Outside the Municipality ( )

iii) Urban market

iiii) In the farm and urban market

iv) Others (specify)……..

2: What is the average distance in km from your field to the main market? *(Provide Number of km*)…….

3: What is the main source of water for the plants in your field?

i) Rainfall only

ii) Rainfall supplemented with simple irrigation facilities ( )

iii) Irrigation only

4: List the irrigation facilities do you use.

……

……

5: How would you describe adequacy of irrigation water in your field?

i) Very adequate

ii) Adequate ( )

iii) Moderately adequate

iv) Not adequate

6: Is there an extension agent in the ward?

i) Yes ( ) No ( )

7: If YES, how often do you get contact with extension agent?

i) Very frequently (*more than once per month*)

ii) Frequently (*once per month*) ( )

iii) Less frequently *(once per more than one month*)

8: Do you have access to any mass media?

i) Yes ( ) No ( )

9 How often do you access each of the identified mass media?

Radio ----------

Television ----------

Farm bulletin ----------

GSM (telephone) ----------

Others: Mention them ……

---

i) Very frequently (*more than once per month*)

ii) Frequently (*once per month*) ( )

iii) Less frequently *(once per more than one month*)

10: How would you describe availability of quality inputs that you strongly need for your tomato growing enterprise?

i) Highly available

ii) Available ( )

iii) Moderately available

iv) Not available

12: Do you get any problem in input acquisition?

i) Yes ( ) No ( )

13: If yes what kind of problem?

i) High cost of input

ii) Are not available at proper time

iii) Both

iv) Others mention…….. ( )

Where do you obtain your input?

i government support programs

ii input dealers

iii markets

To whom do you sell your tomato output?

i off-takers

ii middlemen

iii consumers

14 Did you ever forwarded your problems to policy marker

i Yes ( ) No ( )

if yes in above, were your problems considered and solved

yes ( ) no ( )

15: Is there any money lending institution you can access if you wish?

1) Yes ( ) No ( )

16: What are the lending institutions?

17: Were you able to get it?

i) Yes ( ) No ( )

18: are there associations coordinating tomato value chain?

i) Yes ( ) No ( )

19: If yes, are you a member.

i) Yes ( ) No ( )

THANK YOU