ANALYSIS OF MARKET PARTICIPATION BY WOMEN SOYBEAN FARMERS IN HAWUL LOCAL GOVERNMENT AREA OF BORNO STATE, NIGERIA

BY

HAUWA MOHAMMED ALKALI

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CERTIFICATION

We certified that the Dissertation entitiled "**Analysis of Market Participation by women soybean producers in Hawul local government area of Borno state, Nigeria**" has been duly presented by Hauwa Mohammed Alkali (PGA/13/02/01/07721) of the Department of Agricultural Economics, Faculty of Agriculture, University of Maiduguri, Nigeria.

Supervisor   Head of Department

Name: Dr. Abba S.S. Umar   Name: Dr. Salisu T. Mohammed

Signature:---------------------------   Signature:------------------------------------

Date:--------------------------------   Date:---

DEDICATION

This work is dedicated to my beloved mother Hajiya Yachilla M. Ngileruma

ACKNOWLEDGEMENTS

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ABSTRACT

This study analysed market participation among women soybean farmers in Hawul Local Government Area of Borno state. Multistage sampling procedure was used to select two communities each from five wards known for soybean production intensity and marketing across the twelve wards in the study area. A total of 182 respondents were drawn for the study. Data were collected using structured questionnaire and analysed using both descriptive and inferential statistics. The results revealed that women soybean farmers in the area are high market participants with a participation level of 59% across the whole sample and 72% for soybean market participants only. Probit analysis results shows that the major determining factors influencing women farmer's participation in soybean markets were market information, educational level, group participation, nonfarm income, soybean price, improved seed varieties and household size which were significant at $p<0.01$ and $p<0.05$ respectively. The tobit regression analysis revealed that variables which affected sales volume were age, farming experience, household size, distance to markets, extension contacts, market infrastructure, ownership of communication device, cooperative membership and use of inoculants. Poor market access, high cost of fertilizer, delay in planting time and lack of credits were the most important constraints to market participation in the area. The study recommends that women farmers should be provided easy access to markets, market information and productive resources inorder to acheive maximum market participation. There is the need by government to invest in roads and transportation networks, market infrastructure and market information systems.

CHAPTER ONE

INTRODUCTION

1.1   Background to the Study

A Market is any settting that allows buyers and sellers to exchange any type of goods and services (Heyne *et al*., 2014). Markets provide a link between the local and global economy and help in facilitating economic efficiency through promoting the exchange of goods and services (FAO, 2009).

Agricultural marketing covers all the services involved in moving an agricultural product from the farm to the consumer. It acts as an agent of rural development as it plays a coordinating role by steering demand and supply with respect to place, form and time utilities, Promoting pro-poor opportunities in the commodity and service market (PrOpCom, 2007).

Market access for smallholder rural farmers provide local to global connections that prove to be both opportunities and challenges for rural smallholder farmers (IFAD, 2010). Through access to different markets, farmers are enabled to access inputs and credit, market their produce, access other consumption goods as well as learn about and adopt new technologies (FAO, 2009). It plays a remarkable role in ensuring better incomes and welfare for farmers through diverse channels (Gani and Adeoti 2011). One such channel is market participation (IFAD, 2003). Agricultural market participation refers to the intergration of farmers into the input and output markets of agricultural products with a view to increasing their income levels (Ehui and Holloway, 2002). Farmers can participate in the markets either as output sellers or input buyers, thereby giving market participation a demand and a supply side. Both the decisions to enter the market as a seller or buyer is motivated

by the theory of optimisation where the households seek to maximise utility subject to the cash budget and available resources (Barret, 2008). Beyond production activities, farmer participation in marketing allows transitioning from subsistence to commercial farming (Makhura, 2001). However, for resource poor farmers, especially living in rural areas, the cost and risk of participating in markets is too high (DFID, 2005).

Soybean (*Glycine max*) is a leguminous crop that grows well in tropical, subtropical and temperate regions of the world. It is a high valued commercial crop that has a great potential to sustain production in smallholder farming systems. It has multiplicity of uses such as for making infant weaning food, extraction of oil, processing into cheese, milk and flour, helps in improving soil fertility through biological nitrogen fixation and Striga control (Dugje *et al.,* 2009).

 Worldwide production of soybean was placed at 216 million tonnes per annum of which Africa is responsible for 1.5 million tonnes. Nigeria is the largest producer of soybean in sub- Saharan Africa accounting for about 600,000 metric tonnes annualy (FAOSTAT, 2014). The demand for soybean in Africa has been increasing steadily, driven by the growing feed industry for poultry and aquaculture as well as for home consumption in the form of processed oil, milk, cheese, baked bean and flour (IITA, 2009). Soybean is been cultivated in many states in Nigeria and various projects have intervened in its production due to its importance.

The promoting sustainable agriculture in Borno (PROSAB) was a project introduced by Canadian international development agency from 2004 to 2009 with an objective of contributing to improving rural household livelihoods through the promotion of improved agricultural technologies, management practices and

capacity building for farmers to achieve sustainable agricultural production. This intervention project introduced Soybean as a commercial crop to the southern part of Borno state in the year 2004 (Amaza *et al*., 2009). Another science based research-in-development project named N2Africa was implemented in Nigeria from 2009 to 2013 and was coordinated by IITA with a vision to build sustainable development and to enable smallholder farmers gain from symbiotic N2 fixation by grain legumes through effective production technologies, including inoculants, fertilizers and provision of improved seeds (Kamai, 2015). Borno state was included in the second phase of the project which started in 2014 and will last upto year the 2018. These two projects therefore overlap interms of their objectives and operated in the southern part of Borno state where this study was conducted.

Hawul local government area was one of the areas that received interventions from both PROSAB and N2Africa projects. Women farmers were targeted as beneficiaries of the project inorder to empower them in agribusiness and improve their livelihoods due to their vulnerability as compared to male farmers. Trends in the soybean markets show that there is increased demand for soybean by industrial processors coupled with attractive market prices (PROSAB, 2009). With improvement in technology and research, Soybean production and domestic marketing has grown considerably in the area (Amaza, 2016). A well organized marketing system can thus maximize the income of farmers given the growing demand for soybean both locally and internationally. This study therefore analysed market participation by women soybean farmers in Hawul local government area, Borno state, Nigeria.

1.2   Statement of the Problem

Soybean is a crop with high commercial value due to its protein content and excellent vegetable oil. It can be processed into different food items.The land area under its cultivation is increasing due to its importance and high demand by industries.This has shown that there is a great market potential for the crop`both locally and for export.

Women farmers are important producers and marketers of the high value industrial crop in the study area. However, studies by Kamunye *et al*. (2016) on the determinants of smallholder common bean market participation and extent of participation in Rwanda by gender have shown that female farmers have limited access to formal markets and productive assets as a result of which they dispose their produce through the rural markets with its resulting low market margins. This restricted access to market limits the opportunity for income generation thereby weakening incentives to market participation and resulting in subsistence rather than market oriented farming systems. Studies by Omiti *et al.* (2009); Makhura (2001) and Jagwe *et al.* (2009) on market participation concentrated on smallholder farmers in general, not much research has been conducted to verify the factors influencing market participation by women farmerss .It was againt this background that this study was conducted in Hawul LGA among women soybean farmers where it was introduced as a cash crop to improve their incomes. The following research questions were raised:

i.   what are the socio-economic characteristics of women soybean farmers in the study area?

ii. what factors influence women soybean farmers market participation?

iii what is the level of market participation among the women soybean farmers?

iv. what are the factors influencing level of market participation among the women soybean farmers?

v. what are the constraints to market participation among women soybean farmers in the study area?

1.3 Objectives of the Study

The main objective of the study was to determine the factors influencing market participation among women soybean farmers in Hawul local government area of Borno State, Nigeria. The specific objectives were to:

i. describe the socio- economic characteristics of the women soybean farmers in the study area;

ii. examine the factors influencing women soybean farmers market participation;

iii. determine the level of market participation by women soybean farmers;

iv. determine factors influencing the level of market participation among women soybean farmers and;

v. identify constraints to market participation iamong women Soybean farmers in the study area.

1.4 Significance of the Study

The findings from this study could be essential in contributing to the existing body of knowledge on soybean market participation by providing literature. The

empirical information from this study could benefit policy makers in designing policies that could help enhance womens access to formal markets and market information. It may be of benefit to researchers, Government agencies, Non-Governmental organizations and students as it will provide them with literature for further research. The findings will help N2Africa projects to evaluate their efforts in promoting soybean production, marketing and technology transfer. It will assist stakeholders in the agricultural and industrial sectors to work out strategies by which Soybean markets can be operates efficiently to ensure sustainability.

1.5   Scope of the Study

This study focused on analysis of market participation by women soybean farmers in Hawul local government area of Borno State. It covered women farmers who produce and market soybean in the study area. Data was collected for the 2015/2016 cropping season. The research data was based on women soybean farmers who engage in markets to sell their produce.

CHAPTER TWO

LITERATURE REVIEW

2.1 Socio- Economic Characteristics of farmers

2.1.1 Educational level

Adeoti *et al.* (2014) in a study on the determinants of market participation among maize producers in Oyo state, Nigeria, revealed that average years of formal schooling of the household head was 7 years which was slightly higher than the national average of 6 years.

Nkonya and Kato (2001) conducted a study on Agricultural input marketing in Uganda and found that household crop market participation was determined by literacy of the household head. Jaleta *et al*. (2009) in a study on smallholder commercialization, processes, determinants and impact on Ethiopian farmers found that household crop market participation was determined by literacy of the household head.

2.1.2 Sex

In a study by Ohen *et al*. (2013) on the analysis of market participation by rice farmers in southern Nigeria, it was revealed that 77.3% of the respondents involved in rice marketing were males. Adeoti *et al.* (2014) studied the determinants of market participation among maize producers in Oyo State, Nigeria and found that 89% of the households were male headed. Cunningham *et al*. (2008) in a study on gender differences in marketing styles reported that male household heads sell their produce when prices are high while female households keep their produce for household food self-sufficiency.

2.1.3   Age

Egbetokun and Omonona (2012) studied the determinants of farmer's participation in food markets in Ogun State, Nigeria. The authors revealed that majority (62.6%) of the respondents were in the productive age of between 31 and 50 years. This shows that there is potential for productivity to be high in the area thus increasing market participation.

In a study by Adeoti *et al.* (2014) on the determinants of market participation among maize producers in Oyo State, Nigeria, the mean age was reported as 53 years which implies that an average farm household is still productive and active. In the analysis of market participation by rice farmers in southern Nigeria by Ohen *et al.* (2013) it was revealed that 96.6% of the respondents fell between 20-60 years of age. Randela *et al*. (2008)   observed that younger farmers were expected to be progressive, more receptive to new ideas and better understand the benefits of agricultural commercialisation.

2.1.4   Farm Size

Gebremedhin and Hoekstra (2007) studied cereal marketing and household market participation in Ethiopia. Their findings revealed that size of cultivable land was important in inducing smallholder market participation. Farmers with bigger cultivable land were found to participate more because of their ability to produce bigger volumes that ensured marketed surpluses. Lerman (2004) found farmsize to be an influential asset that leads to higher production volumes and positively influences farmers' market participations. Enete and Igbokwe (2009) further found that the probability of market participation declined with declining farm size for

sellers of cassava but increased with farm sizes for buyers though not significant in either case.

2.1.5 Household Size

Mwena *et al.* (2013) studied the economics of harvesting and marketing selected indigenous fruits in mwinga district of Kenya and reported that large household size negatively influenced the extent of farmer market participation as more of the farm produce will be held for income consumption.

In a study by Apind *et al.* (2015) on the determinants of smallholder farmers extent of market participation; case of rice marketing in Ahero irrigation scheme of Kenya, they reported that average household size was approximately 6 people and is slightly above the Kenya national mean figure of 5 members per household.

2.1.6 Farming Experience

A study by Masuku *et al*. (2010) on factors affecting marketing decisions in maize supply chain among smallholders in Swaziland found a positive and significant relationship between smallholder farmers maize market participation and experience in marketing channels. Yaynabeba and Tewodros (2013) conducted a study on factors influencing marketing participation decision and extent of participation of haricot bean farmers in meskan district of Ethiopia. The study revealed that farming experience of the household head was significant at 10% level. The result show that when the household head experience increase by 1 year, the probability of participation in marketing of haricot bean increases by 0.36%.

2.1.7 Access to Credits

In a study conducted by Yaynabeba and Tewodros (2013) on the factors influencing market participation decision and extent of participation of haricot bean farmers in meskan district of Ethiopia, they revealed that access to credit was significant at 5%

probability level as indicated by the marginal effect , an increase in credit access has a probability of increasing the participation of farmers by 6.75%.

Alene *et al.* (2007) studied smallholder market participation under transaction cost in Kenya and reported a positive and significant relationship between access to credits and maize market participation decision.

2.1.8 Membership of groups

Yaynabeba and Tewodros (2013) studied factors influencing market participation decision and extent of participation of haricot bean farmers in meskan district of Ethiopia. The results revealed that group membership was negative and significant at 10% level. The marginal effect result revealed that membership of an organization decreased the probability of market participation by 6.76%.

A study conducted by Mathenge *et al.* (2010) on participation in agricultural markets among the poor and marginalized in Kenya showed that membership to an organization had a significant effect on market participation and positively influenced their participation.

2.1.9 Access to Extension Services

Okoboi (2001) on the study of marketing potential of potatoes in Uganda and market opportunities for Rwanda revealed that the coefficient of extension services is positive and significantly influenced the extent of market participation among the farmers. It indicates that access to extension services increased the extent of market participation by 0.030 among the farmers.

2.2 Determinants of Market Participation

Adeoti *et al.* (2014) studied the determinants of market participation among maize producers in Oyo state, Nigeria. The study reveaved that the coefficient of educational status showed a positive relationship with market participation and it was significant at 5%. This shows that farmers with formal eduation are more market oriented, knowledgable about prevailing market situations and therefore produce to take advantage of the market environment.

Jari and Fraser (2009) in a study of analysis of technical and institutional factors influencing agricultural marketing among smallholder farmers in the rift valley of the cape province found that good road condition and access to information positively influenced farmer participation and access to markets due to their effect on reduction in transaction costs.

In a study by Boughton *et al.* (2007) on market Participation by rural households in a low-income country, the authors used an asset-based approach to study patterns of household market participation in Mozambique. The authors found that private household assets especially land, livestock and farm equipment positively affected crop market participation.. The study further found that households with larger livestock endowments produced and sold more crop produce. Shephard (2007) studied approaches to linking producers to markets and reported that collective action in form of farmer cooperatives or groups increase smallholder market participation. Njuki *et al.* (2006) found that forming farmer group is essential for

efficient farmer learning, receiving external support and achieving economies of scale, it is accompanied by incentives to participate in markets.

 Makhura *et al*. (2001) Transaction costs and smallholder participation in the maize market in the Northern Province of South Africa found that distance to the market negatively influences both the decision to participate in markets and the proportion of output sold. Transport costs per unit of distance increases with the potential marketable load size. For farmers in very remote rural areas, geographic isolation through distance creates a wedge between farm gate and market prices. Key *et al*. (2000) in a study of transaction costs and agricultural household supply response reported that distance to the market negatively influences both the decision to participate in markets and the proportion of output sold.

Jaleta *et al*. (2009) studied smallholder commercialisation, processes, determinants and impact in Ethiopia and reported that ownership of livestock by a household negatively affected its participation in crop market because it distracts the farmer into an alternative source of income. Sebatta *et al*. (2014) in a study in Uganda using the Heckman two stage model observed that proximity to a village market positively and significantly influenced the decision to participate in potato markets. Results from the second stage of the model indicated that non-farm income earned negatively and significantly affected the potato farmers level of market participation.

In a study by Osmani and Hossain (2015) on market participation decision of smallholder farmers and its determinants in Bangladesh, it was revealed that the explanatory variable farm size was signicant at 1% and has positive influence on decision for market participation meaning that as farm size increases, the probability of decision for commercialization increases.

The result further shows that household labour has a positive effect at a significant level of 1% on the decision of households to participate in the output market implying that if a farm family has more active labour, its probability of taking decision to participate increases. This is consistent with Gebremedhin and Jaleta (2010) which show that households with larger number of active household labour can reduce their cost of production and produce surplus to be market oriented.

2.3   Level of Market Participation and its Determinants

Jagwe *et al*. (2009) studied transaction costs and smallholder farmer's participation in banana markets in the great lakes region of Burundi . They reported that transaction cost related factors such as geographical location, market information sources and travel time to the nearest market, labour availability, farming experience, gender of household head, off farm income and household asset base affect smallholder's likelihood and intensity of participation in markets. In a study by Enete and Igbokwe (2009) on Cassava market participation decision of producing households in Africa, it was found that price had an important influence on the level of farmers' market participation in cassava markets which is supported by economic theory that price induces increased supply.

Omiti *et al*. (2009) on the study of factors Influencing the Intensity of market participation by smallholder farmers in Kenya revealed that better output price and market information were key incentives for increased sales in the market, while household size and non-farm income significantly reduced the sales of vegetables in the market. Jagwe (2011) studied the impact of transaction costs on the participation of smallholder farmers and intermediaries in the banana markets of Burundi, Democratic Republic of Congo and Rwanda using a two-stage Heckman

model and found that belonging to a farmer's group, household size and distance to the market significantly influenced extent of farmers' participation in banana markets. The results showed that farmers who belonged to a farmers' group had cohesion in terms of gaining and sharing knowledge as well as capacity to produce more for a marketable surplus.

A study conducted by Eskola (2005) on commercialisation and poverty in Tanzania, household-level analysis showed that distance to the nearest market and the availability of market information were found to be significant factors in household's degree of commercialisation. According to Siziba *et al.* (2011) in their study on the determinants of cereal market participation by sub Saharan Africa smallholder farmers reported that households need to access productive assets adequate private and public investment, institutional and physical infrastructure to access remunerative markets, these determine their influence on extent of market participation. Barrett and Swallow (2006) in their study on smallholder market participation found out that the source of market information had a positive and significant influence on the extent of market participation by 0.026. This result conforms to the findings of Jagwe *et al*. (2010) which revealed that irrespective of the source of information, it remains critical for market participation.

Holden and Binswanger (1998) studied small farmer decision making, market imperfections and natural resource management in developing countries. The authors found that transaction cost-related factors such as geographical location, market information sources, and travel time to the nearest market, labour availability, farming experience, gender of household head, off-farm income and household asset base affect smallholder farmers likelihood and intensity of participation in markets.

Ferris *et al.* (2001); Nkonya and Kato (2001); Aliguma *et al.* (2007) found that the low crop yields were attributed to farmers' failure to use improved inputs leading to lack of competitive production and low market participation. Okoboi (2001) revealed that small plots of land and high costs of inputs had limited the potato yields in Uganda and hence limiting the profits of smallholder producers. The coefficient of extension services is positive and significantly influenced the extent of market participation among the farmers. It indicates that access to extension services increased the extent of market participation by 0.030 among the farmers. The study further found out that access to credit positively influenced the extent of market participation and was significant. The coefficient of credit was 0.093 implying that a farmer who acquired credit was more likely to sell 9.32% of their produce than those who did not.

2.4   Constraints to Market Participation among Farmers

Kherallah and Minot (2001) explained that informal markets embrace unofficial transactions between farmers and from farmers directly to consumers while formal markets have clearly defined grades, quality standards and safety regulations and prices are formally set. Smallholder farmers find it difficult to penetrate the formal markets, due to high transaction costs, high risks, missing markets and lack of collective action (Mangisoni, 2006).

Key *et al.* (2000) in their study on transaction costs and agricultural household supply response reported that majority of smallholder farmers are located in remote areas with poor transport and market infrastructures, contributing to high transaction costs. In addition, they lack reliable market information as well as information on potential exchange partners. According to Jayne *et al.* (2002) the problem of market participation is linked to farmer's inability to meet market

standards, low volume of produce, wide dispersion of producers, presence of middlemen and perceived low prices in the markets. Barrett (2008) on smallholder market participation in eastern and southern africa observed that price based, top down macro and trade policy interventions have not been enough to stimulate smallholder market participation and agricultural and rural transformation as expected. Inability to get contracts becomes a problem when they produce marketable surpluses because they will be stuck with these surpluses.

Jayne *et al*. (2002) reported that the problem of market participation is linked to farmer's inability to meet market standards, low volume of produce, wide dispersion of producers, presence of middlemen and perceived low prices in the markets. Barrett (2008) observed that price based, top down macro and trade policy interventions have not been enough to stimulate smallholder market participation and rural transformation as expected. Inability to get contracts becomes a problem when they produce marketable surpluses because they will be stuck with these surpluses. Siziba *et al*. (2011); Jagwe *et al*. (2010); Pingali *et al.* (2005) reported that the barriers in agricultural commodity marketing that discourage smallholder farmers from participating in formal markets range from household characteristics for instance, low education level, labour shortages, inadequate government services, high transaction costs and lack of physical infrastructure. Ferris *et al*. (2001); Nkonya and Kato (2001) and Aliguma *et al*. (2007) found that the low crop yields were attributed to farmers' failure to use improved inputs leading to lack of competitive production and low market participation. Okoboi (2001) revealed that small plots of land and high costs of inputs had limited the potato yields in Uganda and hence limiting the profits of smallholder producers.

World Bank (2008) puts to light the fact that especially for seed and fertiliser, market failures continue to be pervasive in Sub-Saharan Africa because of high transaction costs, risks and low economies of scale. Barrett (2007) studied market participation in staple grains, found that barriers to participation in markets by smallholders were mainly land, livestock, capital and improved technologies like farm equipment needed to generate a surplus that influenced market participation. On the other hand, Pravakar *et al*. (2010) found that households with larger land holdings per adult member sold larger volumes of their produce as compared to those with smaller land holdings

CHAPTER THREE

METHODOLOGY

3.1   The Study Area

This study was conducted in Hawul local government area of Borno State. The area is located in the southern guinea savanna zone and lies between latitudes 10° 43'N and longitudes 12^0 25'E (fig 3.1). It has a total land area of about 2,098 square kilometres and total population of 120,314 persons of which 60,319 were women (NPC, 2006). The projected population for the area in 2016 was placed at 158,814 based on an annual growth rate of 3.2 per cent. The area is bordered to the north by Biu LGA, Shani LGA to the south and Askira Uba LGA to the south east.

The mean annual rainfall in the area is 1500mm. Tesmperatures range from 29^oC to 39^oC. The main activity of the people in the area include farming and animal husbandry, others are civil service and trading (Samuel, 2014). The major crops grown and traded in the area include maize, cowpea, sorghum, groundnut, soybean, rice and vegetables such as tomato and pepper. The climatic condition of the area is favourable for soybean production. The crop performs well in the northern and southern guinea savannah zones where rainfall is more than 700mm (Dugje *et al*., 2009). Soybean has emerged as an important commercial crop in the study area with a large number of women farmers going into its production and sales. In addition to that, they add value through processing it into oil, soy milk and cake (Amaza, 2016).

Some notable markets in the area where these crops are traded include Yimirshika, Ngwa, Kinging, Tashan alade, Kwajaffa and Marama markets .
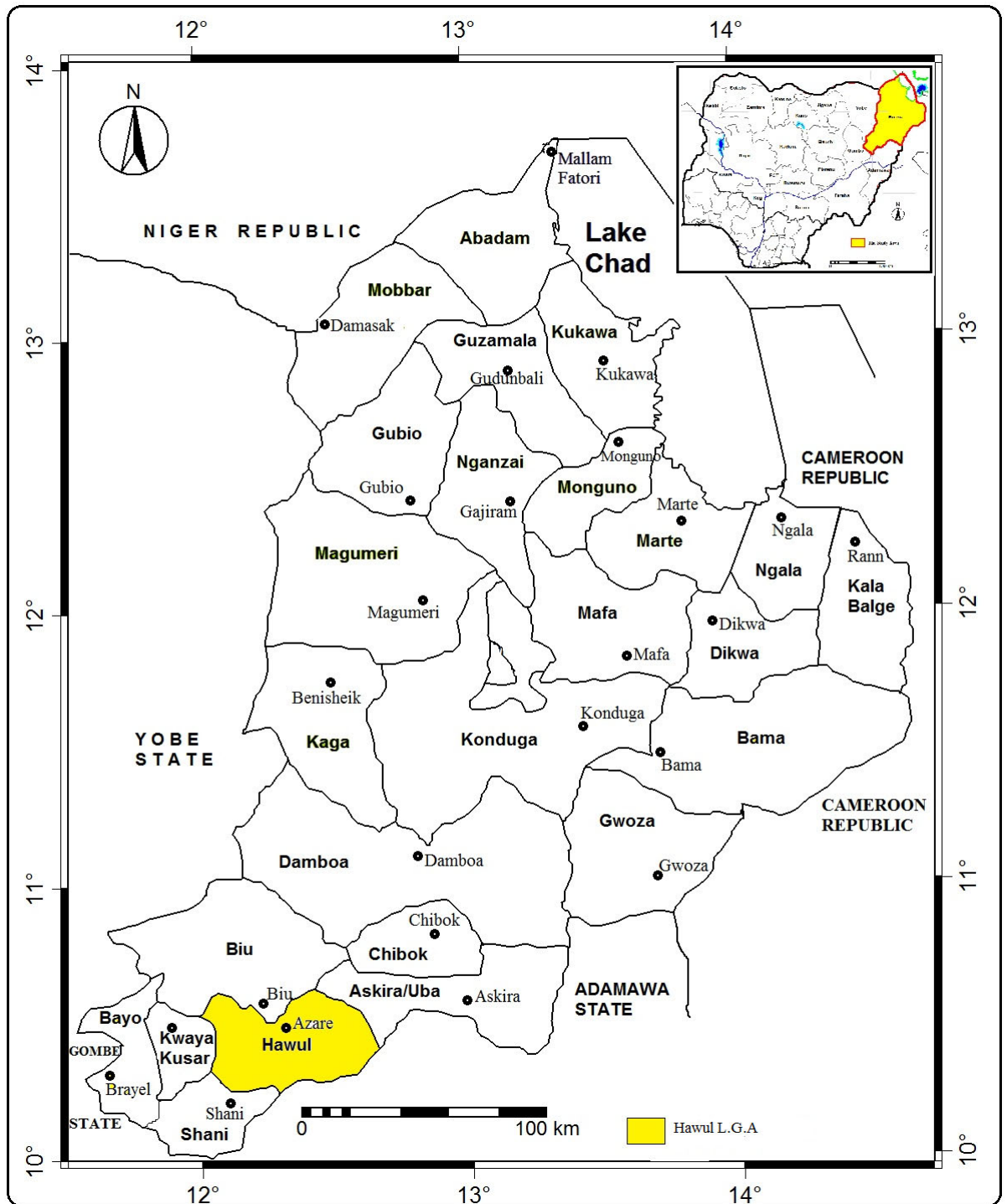
Source: GIS Laboratory, Dept. of Geography, University of Maiduguri (2015)
Figure 3.1 Map of Borno State showing the study area

3.2   Sampling Procedure

Multistage sampling procedure was used to select respondents for this study. In the first stage, five wards namely Kwajaffa Harrang, Marama kidan, Grim danchuba, Shaffa Hizshi and Pama Hutambaya were purposively selected out of the twelve wards in the study area notable for intensity of soybean production and marketing. In the second stage, two communities each were randomly selected from the five wards. In the third stage, proportionate selection was used to select 10 per cent of respondents based on the population from the sampling frame which was a list of women soybean farmers obtained from the active women groups in the study area. A total of 200 samples were drawn for the study. Out of the 200 questionnaire administered, 182 were retrieved and subjected to analysis.

Table 3.1: Distribution of respondents based on their wards and communities

Wards	Communities	No. of respondents	Total
Kwajaffa/Harang	Kwajaffa	20	32
	Tashan Alade	12	
Shaffa/Hizshi	Shaffa	20	35
Bwala	Azare	15	
Marama/Kidan	Marama	33	43
	Mbulatawiwi	10	
Grim/Danchuba	Tong	16	36
	Dantsoba	20	
Pama/Hutambaya	Ngwa	21	36
	Yimirshika	15	
			182

Source: Field survey, 2016

3.3 Sources of Data

This study made use of primary data and secondary information. The primary data was collected through the use of structured questionnaire with the help of trained enumerators. Data were collected on socio-economic characteristics of the respondents, output levels, prices, factors of market participation and constraints to market participation. The secondary information was obtained from books, journals, unpublished projects, internet and research reports.

3.4 Analytical Techniques

This study made use of descriptive and inferential statistics. These tools were used to analyze the data collected.

3.4.1 Descriptive statistics

Descriptive statistics used were frequency distribution tables, means, standard deviation and percentages. These tools were used to acheive specific objectives (i) and (v) of the study.

The level of soybean market participation was computed using the household commercialization index (HCI) as proposed by Govereh *et al.* (1999) and Straasberg *et al.* (1999) to achieve objective (iii) of the study. Farmers whose HCI was above 60 percent were considered as market participants. It was computed as follows;

$$HCI_{is} = \frac{\text{Gross value of Soybean sale}_{ij}}{\text{Gross value of Soybean production}_{ij}} \times 100$$

Where:

HCI$_{is}$ = the ith farmer commercialization index for Soybean. It is a proxy measure for level of participation among farmers

Numerator = Total amount of soybean sold by the ith farmer in the jth year

Denominator = Total value of soybean output by the ith farmer in the jth year

j = 2015/2016 farming season

3.4.2   Inferential statistics

The inferential statistics employed were the probit regression model and the tobit regression models. These tools were used to achieve objectives (ii) and (iv) respectively. This study utilizes the approach by considering the participation and level of sales decisions in the context of probit and tobit models that were employed independently as done by Lapar *et al.*, (2003). They used the probit model to determine the factors influencing the decision to sell while the Tobit model analyses the factors influencing sales volume.

3.4.2.1 Probit Model

A farmers decision to participate in markets is influenced by many socioeconomic, institutional and farm specific characteristics. The probit model was used to analyze those factors influencing market participation of women soybean farmers. The decision to participate in the market is discrete and it takes a value of 1 if a farmer participates and 0 otherwise. Drawing from Von Braun and Immink (1994) ; Goletti (2005); Ohen *et al.* (2013) the explicit form of the probit model is expressed as:

$$y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \ldots + \beta_{10} X_{10} + \varepsilon_i \text{ --------------------2}$$

$$y = \begin{Bmatrix} 1 \; if \; y^* > 0 \\ 0 \; if \; y^* \leq 0 \end{Bmatrix}$$

Where:

   $y =$ Binary response defined as 1 if a farmer participates and 0 otherwise

   $\beta =$ Estimated parameters

   $X_1 =$ Market information (1=Yes, 0 otherwise)

   $X_2 =$ Farmers education level (years spent in school)

X_3 =   Group participation (1=Yes, 0 otherwise)

X_4 =   Household size (number of persons in family)

X_5 =   Non farm income (Naira)

X_6 =   Access to credit (yes=1, 0, otherwise)

X_7 =   Transportation cost (Naira)

X_8 =   Distance to market (km)

X_9 =   Price of soybean ((Naira/kg)

X_{10} =   Use of improved seed varieties

β_0 =   Intercept

ε =   Error term

3.4.2.2. Tobit Regession Model

The determinants of the level of market participation was estimated using the tobit model. The model is explicitly expressed as:

$Z_i^* = \alpha_0 + \alpha 1S1 + \alpha 2S2 + \alpha 3S3 + \ldots + \alpha 12S12 + \varepsilon_i$……………….3

Where:

Z_i^* =sales volume in percentage

α_0 = intercept

α = parameters

ε_i = error term

S_1 = Age of the farmer (years)

S_2 = Farming experience (years)

S_3 = Household size (Number of persons in the family)

S_4 = Distance to market (Km)

S_5 = Farm size (Hectares)

S_6 = Non-Farm Income (Naira)

S_7 = Transaction cost (Naira)

S_8 = Access to Extension Agent (Yes = 1, 0 otherwise)

S_9 = Inoculant (Yes = 1, 0 otherwise)

S_{10} = Market infrastructure (Yes = 1, 0 otherwise)

S_{11} = Ownership of communication device (yes = 1, 0 otherwise)

S_{12} = Membership in cooperative (yes 1, 0 otherwise)

Table 3.2 : **Explanatory variables and their hypothesized effects on market participation**

Variable	Type	Def and measurement	Hypothesized effect
Mkt Inf	Dummy	1 if accessible 0 otherwise	+
Edu. Level	Continuous	Years of schooling	+
Grp Part.	Dummy	1 if participant 0 otherwise	+
HHSize	Continuous	No. of persons in HH	+
Non-farm I	Continuous	Total Income from NF sources	+/-
Credit Acc	Dummy	1 if took credit 0 otherwise	+
Trans. Cost	Continuous	Cost of transportation	_
Dist. To Mkt	Continuous	Avrg. Dist to mkt in Km	_
SB price	Continuous	Price of soybean in Naira	+
Imp. Seeds	Continuous	imp varieties of soybean	+
Farm size	Continuous	Hectares	+

Source : Authors defination

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1   Socio-economic Characteristics of the Respondents

The results of the distribution of socio economic characteristics of the respondents is presented in table 4.1.

4.1.1   Age: The result showed that 9.9% of the respondents fall between 15-20 years of age, 22% fall between 21-30, 31.9% fall between 31-40 and 22.5% fall between 31-40 years of age..This implies that they are in their economically active age. This shows that there is potential for productivity to be high in the area thus increasing market participation This is in line with the findings of Egbetokun and Omonona (2012) who revealed that majority 62.6% of the respondents in their study were in the productive age of between 31 and 50 years.

4.1.2   Marital status: The result revealed that 68.1% of the respondents were married, 12.6% were single, 11% were divorced and 8.2% were widowed. Married farmers constitute the majority, this implies that married farmers have more economic and social responsibilities to meet hence engage in production and sell more soybean to cater for their needs.

Table 4.1: Socioeconomic characteristics of women soybean farmers (n = 182)

Variables	Frequency	Percentage
Age of the respondent (years)		
15-20	18	9.9
21-30	40	22.0
31-40	58	31.9
41-50	41	22.5
above 50	25	13.7
Marital status		
Married	124	68.1
Single	23	12.6
Divorced	20	11.0
Widowed	15	8.2
Educational qualification (level)		
no formal education	60	33.0
Primary	70	38.5
Secondary	47	25.8
Tertiary	5	2.7
Household size		
≤ 5	60	33.0
6-10	80	44.0
11-15	30	16.5
16 and above	12	6.6
Annual Income from processing		
<20000	30	16.5
20000-40000	78	42.9
40001-60000	22	12.1
60001-80,000	18	9.9
Above 80000	34	18.7
Soybean Farming experience		
<5	107	58.8
5-10	68	37.4
11-15	6	3.3
Above 15	1	.5
Farm size (hectares)		
≤1	26	14.3
2-4	76	41.8
4-6	66	36.3
above 6	14	7.7
Group membership		
Member	143	78.6
Not member	39	21.4
Access to extension agents		
Have access	138	75.8
No access	44	24.2
Access to credit		
Had access	27	14.8
No access	155	85.2

Source: Field survey, (2016)

4.1.3 Educational qualification: The results showed that 33% of the respondents had no formal education, 38.5% had primary education, 25.8% had secondary education while only 2.7% received tertiary education. About 67% of the total respondents had some formal education from primary to tertiary. This shows that the average farmer has atleast primary school education and its implication is that farmers with formal education are more market oriented , knowledgeable about prevailing market situations and therefore produce to take advantage of the market environment. This is in line with Adeoti *et al*. (2014) whose findings show that average years of formal schooling was 7 years which was slightly higher than the national average of 6 years.

4.1.4 Household size: Household size is an indicator of amount of family labour that is available for agricultural activities. From the results, 33% of the respondents have a household size of 0-5 members, 44% had 6-10 members, 16.5% had 11-15 members and 6.6% had 16 members and above. This implied the availability of family labour on the farm which could boost production thereby creating marketable surplus.

4.1.5 Farming experience: The results further reveal that 58.8% of the respondents had from less than 5 to 5 years of soybean farming experience, 37.4% had 5-10 years of experience, 3.3% had 11-15 years and only 0.5% had above 15 years of soybean farming experience. This is due to the fact that the crop was new to the area before the year 2004 when it was first introduced as a cash crop by PROSAB and N2Africa project came in 2014 to enhance the yield of the crop .

4.1.6   Farm size: The result showed that 14.3% of the respondents have farm sizes of 0-1 hectare, 41.8% reported 2-4 hectares, 36.3% had 4-6 hectares while 7.7% had above 6 hectares of land. This implies that women farmers are small scale farmers who produce at the subsisitence level.

4.1.7   Extension contacts: Results reveal that 75.8% of the respondents had contact with extension agents. Extension agents expose farmers to new marketing ideas and ways to handle risk and assist them to make decisions that could benefit them.

4.1.8   Group membership: The results reveal that 78.6% of the respondents belonged to active groups. This implies that group membership is beneficial to the farmers as working in a group creates synergy among farmers and enable them to access market information, market their produce jointly which could lower transation cost, as well as share experiences.

4.1.9 Credit Access: Credit is necessary for the acquisition of inputs and payment of casual labour. The results show that only 14.8% of the respondents had access to credits. This shows that women are challenged in accessing credits and other productive resources due to their low collateral level. This conforms with the observation by martey *et al.* (2012) that access to credit is one of the major constraint faced by farmers.

4.2   Factors Influencing market participation of women soybean farmers
The results of the probit model is presented in Table 4.2. The ratio statistics indicated by chi-square statistics are highly significant (p< 0.0000). This suggests that the model has a strong explanatory power. The pseudo R^2 is 0.7175 meaning

that the regressors were able to explain 72% of market participation in the study area.

Table 4.2 : Probit model results for factors influencing market participation

Variables	parameter	coefficients	Std. Err.	Z	P>|z|
Constant	β_0	19.11416	5.261671	3.63***	0.000
Mkt. inf (X1)	β_1	0.026584	0.00065	4.09***	0.000
Edu. Lev (X2)	β_2	1.119572	0.4140033	2.70***	0.007
Grp Part (X3)	β_3	2.85368	0.763549	3.74***	0.000
HH size (X4)	β_4	0.5478285	0 .2362664	2.32**	0.020
Non FI (X5)	β_5	0 .1519295	0 .0326901	4.65***	0.000
Cred. Acc (X6)	β_6	0.1985946	0 .1662978	1.19 ns	0.232
Trans Cost(X7)	β_7	-0.315837	0 .0543648	-5.81***	0.000
Dist.to mkt(X8)	β_8	-0.7122461	0.1981576	-3.59***	0.000
Sbean price(X9)	β_9	0.0039941	0.0010492	3.81***	0.000
Imp seeds(X10)	β_{10}	0.3759946	0.1415156	2.66***	0.008

Log likelihood = -22.075553

LR Chi2 (10) = 112.12

Prob> chi2 = 0.0000

Pseudo R2 = 0.7175

Source : Regression results 2016

Note : ***, **, are significant at 1% and 5% respectively

ns : not significant

The result revealed that with the exception of transaction cost and distance to markets, all the other 8 explanatory variables in the model had positive influence on market participation. Access to credit was positive but insignificantly influenced the likelihood of soybean market participation.

The coefficient of market information (0.027) was positive and significant (P<0.01) . This implies that as market information increases by one unit, market participation will increase by 2.7%. Market information irrespective of formal or non formal empowers farmers on the prevailing market prices, opportunities and market demand. This is very important to market participation as farmers who have more access to market information incur less transaction costs. This is similar to the findings of Randela *et al.* (2008) who reported a positive and significant relationship between market information and market participation decision in cotton markets.

The coefficient of level of education (1.119) was positive and significant at (P<0.01) . This implies that a unit increase in level of education will probably increase likelihood of market participation by 1.119%. This means that as the level of education increases, the farmer acquires more information about markets and tries to make positive decisions. This is inline with the findings of Makhura (2001) who reported a positive and significant relationship between education and maize producers market participation decision.

The coefficient of group participation (2.85) was   significant (P<0.01) and positively influenced market participation decision. This implies that working in a group creates synergy among farmers and enable them to access market information as well as share experiences. This is in line with Abera (2009) ;

Fischer and Qaim (2012) which reported that group participation improves access to banana technology, training, output markets and increases profits.

The coefficient of Household size (0.548) was positive and significant ($P< 0.05$) The implication is that a unit increase in the size of the household will probably lead to 0.548% increase in market participation. This would be so because it has been shown earlier that majority of the respondents had more family members ranging from 6-15 persons for farming activities (table 4.1). This is inline with Akunbile (1999) findings that local farmers keep large family sizes for agricultural purposes.

The coefficient of non farm income (0.152) was found to be significant ($P< 0.01$) and it positively influenced the likelihood of market participation. This shows that as income from non farm activities increases by a unit, participation will also increase by 0.15% . This indicates that the farmer has available resources for marketing activities.

The coefficent of access to credit (0.199) was positive but insignificant as revealed by the results. Although credit is very important to marketing activities, the findings however show that it has no significant impact on the decision of farmers to participate in soybean markets. The reason might be that women farmers find it difficult to access credits from lending agencies due to their low collateral.

The results further revealed that coffcient of transaction cost (-0.316) which was proxied by transport cost was significant ($P< 0.01$) but had a negative sign as earlier hypothesized. This means that as transaction costs increases, participation in markets decreases. Farmers living further away face high transportation costs

to markets than their counterparts who live closer and have lower transaction costs and interface with more market opportunities.

The coefficient of distance to the market (-0.712) was negative and significantly related to probability of farmers market participation at (P< 0.01). This implies that as distance increase by a unit, the probability to participate decreases by 0.71%. Farmers who are closer to markets will more likely participate in marketing activities than those living further away. They could easily convey their produce due to the nearness in distance.

The coefficient of soybean price (0.003) has a positive and significant relationship with the decision to participate in soybean markets at (P< 0.01). This is due to the fact that farmers respond to higher prices which increases their margins. This result is supported by Jaleta *et al*. (2009) findings that favourable prices influence participation in markets.

The results further reveal that the cofficient of Improved seed varieties (0.376) is positive and significantly influenced market participation at (P< 0.01). This implies that improved seed varieties have high yield potential and are disease and pest resistant thus improve productivity and marketable surplus (Technoserve, 2011).

4.3 Level of Market Participation

The result of the level of market participation is presented in table 4.3. The analysis showed that women soybean farmers level of market participation in the study area is high according to the HCI. The commercialization index was found to be 59 per cent among the sampled women soybean farmers and 72 per cent among the women market participants. According to Abera (2009) individual HCI indices were used to

characterise farmers according to low, medium and high commercial farmers. For farmers that sold 25% and below are low commercial farmers, those who sold between 26-50% are medium commercial farmers and above 50% are considered high commercial farmers.The statistical summary of soybean produced and sold with market participation status is presented in table 4.3 below.

Table 4.3 : Level of Market participation among women soybean farmers

Variable	Sample	Min	Max	Mean	Stan. Dev
Total value of Soybean produced(kg)	182	100	1200	566.67	314.02
Total value of Soybean sold(kg)	182	50	1100	359.34	271.27
Market participation(%)					
(whole sample)	182	4.4	100	59	0.2062
(participants)	114	43.4	100	72	0.110

Source : Field survey, 2016.

The maximum amount of soybean produced by the sampled women farmers in the study area for the 2015/2016 cropping season was 1200 kg with a mean of 566.67 kg and the tsotal quantity sold was 1100 kg with an average of 359.34kg. A 50kg bag sold at N13,500 with majority of the farmers selling at the village market centres. The market participation for the whole sample was computed to be 59%. Farmers who sold 60% and above were considered as Soybean market participants. Out of the 182 respondents, 114 were found to sell above 60% thus considered as market participants. The level of commercialization among the participants was found to be 72%. This shows that they are high commercial farmers and soybean is a cash crop that is produced for market to enhance incomes.

4.4   Factors affecting level of market participation

The determinants of level of market participation were estimated using the tobit model involving twelve regressors as presented in table 4.4 below. The results show a log likelihood of – 258.47 and a chi-square of `288.37. The R^2 = 0.36 meaning that 36 per cent variability in the level of market participation was accounted for by the independent variables.

Table 4.4 : Tobit estimates for factors affecting level of market participation

Variable	Notation	Coef.	Std. Err.	t	P>|t|
Age (yrs)	S_1	2.667567	.1044741	25.53***	0.000
Farm.exp(yrs)	S_2	2.053666	.6749607	3.04***	0.003
HHsize(no.)	S_3	2.200825	.5686422	3.87***	0.000
Dist.Mkt(km)	S_4	-.4305237	.21349	-2.02**	0.045
Farm size(ha)	S_5	2.316623	.9766253	2.37**	0.019
Non farm I(N)	S_6	.2499018	.0957017	2.61***	0.010
Trans.cost(N)	S_7	-.1738446	.0849575	-2.05**	0.042
Ext. Cont	S_8	1.672531	.4638034	3.61***	0.000
Inoculant	S_9	1.238561	.4364102	2.84***	0.005
Mkt. Infrs	S_{10}	.2499018	.0957017	2.61***	0.010
Comm.device	S_{11}	.1738446	.0849575	2.05**	0.042
Coop memb	S_{12}	.290172	.0192299	15.09***	0.000
Cons	α_0	3.820442	.5679422	6.73***	0.000
sigma		1.201467	.0771901	1.049092	1.353841

LR chi2(12)   =   288.37
Prob > chi2   =   0.0000
Log likelihood = -258.46936
Pseudo R2   =   0.3581

Note: ***,** are significant at 1% and 5% respectively

The results revealed that coefficient of age of the farmer (2.668) had a positive sign and significantly influenced the volume of sales at (P<0.01). This implies that as the respondent ages on, she will have more experience thus plans and organises her farm to boost yields hence increasing market participation.

The coefficient of farming experience (2.054) was positive and significant at (P<0.01) probability level. This means that farming experience is positively correlated with the amount of soybean sold. The amount of soybean sold increases by 2.1% for an additional year of farming experience. This is inline with the findings of martey *et al.* (2012) that experienced farmers are able to take better production decisions and have greater contact which allow trading opportunities to be discoverd at low costs.

The coefficient of household size (2.201) was found to be positive and significant at (P<0.01) level. This means that as the number of family members increases, the level of sales increases. This could be as a result of more responsibilities to meet and more labour to work on the farm thereby producing marketable surpluses which boost sales. This concurs with the findings of Onoja *et al*. (2012) who reported that household size significantly influenced extent of market participation in fish markets in Niger delta region.

The result further revealed that the coefficient of distance to the nearest market (-0.431) had a negative sign and was significant at (P<0.05) level. This means that as distance to the nearest market increases by 1km, level of sales decreases by 0.43 percent .

Coefficient of Farm size (2.312) was positive and statistically significant at (P<0.05) level. This could be attributed to the fact that a larger area of arable land provides a greater opportunity to produce surplus which require sales.

The coefficient of non farm income (0.249) was positive and significantly influenced volume of sales in the markets at (P<0.01). This implies that as the respondents non farm income increases, the level of market participation also

increases by 2.4 per cent. This indicates that income from other sources such as trading,wages among others is utilized on the farm to boost production.

The coefficient of transaction cost (-0.174) was negative and significant at (P<0.05) level. This indicates that higher transaction costs which is proxied by transportation costs lowers incentives for market participations.

The results also reveal that coefficient of extension contact (1.673) was significantly positive at (P<0.01) level. This implies that as extension visits increase by a unit, quantity of sales increases by 1.67%. Extension service is an important source of information to farmers. The frequency of extension visits to farmers increases level of market participation.

The coefficient for use of inoculants (1.239) is significantly positive at (P<0.01) level. It increases level of sales in soybean markets by 1.23%. The likely explanation is that rhizobial inoculants improve yields.

The results show that the coefficient of market infrastructure (0.249) is positively significant at (P<0.01) level. When the infrastructure is poor, farmers are generally discouraged to use it and those who do use the infrastructure experience high costs (Makhura *et al*., 2001). Binswanger *et al*. (1993) reported that the major effect of roads is not via their impact on private agricultural investment but rather on marketing opportunities and reduced transaction costs of all sorts.

The coefficient of ownership of communication device (0.174) which was proxied by ownership of phones had a positive sign and was signifant at (P<0.05) level. This implies that as a farmer owns a phone it gives him access to market information thereby improving his decision making skills and boosts his sales. This is consistent with Olwande and Mathenge (2012) who found that the

ownership of communication device has positive and significant influence on the amount sold.

The coefficient of membership of cooperative (0.290) was positive and statistically significant at (P<0.01) level as shown by the results. This means that a unit increase in cooperative membership will increase sales volume by 0.29 percent. This results show the importance of cooperatives in promoting marketing activities among farmers.

4.5   Constraints to Market Participation

Table 4.5 : Distribution of respondents based on Constraints to Market participation

Constraints	Frequency	Percentage	Rank
Poor market access	123	67.6	1st
High cost of fertilizer	103	56.6	2nd
lack of credit	87	47.8	3rd
Delay in planting time	82	45.1	4th
Bad roads	165	90.7	5th
High cost ofchemical herbicide	109	59.9	6th
Lack of improved seeds varieties	45	24.7	7th
Lack of storage facilities	122	67.0	8th
Insecurity	111	61.0	9th

Source : Field survey, 2016

The constraints faced by the women soybean farmers in the study area are presented in table 4.5 above in order of importance. The results revealed that 67.6% of the respondents reported poor market access as the major problem militating against soybean market participation. The results further show that 56.6%, 47.8%, 45.1% of the respondents reported high cost of fertilizer, Lack of access to credits and delay in planting time respectively. A great percentage, 90.7% attributed lack of good roads as the fifth most important constraint to market participation. Others included high cost of chemical herbicides 59.9% lack

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of improved seed varieties 24.7%, lack of storage facilities 67% and insecurity 61% which ranked from sixth to ninth respectively. The effects of these problems limits market particiption and could hence lead to the reduction of women farmers incomes in the study area.

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CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1   Summary

This study analysed market participation among women soybean farmers in Hawul local government Area, Borno state, Nigeria. The specific objectives were to describe the socioeconomic characteristics of the women farmers in the area, examine the factors influencing market participation, determine the level of market participation in the study area and look into the factors affecting the level and finally identify constraints to market participation. Multistage sampling procedure was employed to select 182 respondents for the study. Structured questionnaire were used to collect data for the study and the data were analysed using descriptive statistics such as means, percentages, frequencies and household commercialization index and inferential statistics (probit and tobit regression models) .

The study revealed that 76.4% of the respondents fall within the age group of 21-50 years, 68% were married with a modal household size of 6-15 members. It also showed 67% had formal education from primary to tertiary level with majority 99.5% having soybean farming experience from 1 to 15 years. The probit model results revealed that the variables market information (0.027), educational level (1.119), group participation (2.854), household size (0.548), non farm income (0.152) , transaction cost (-0.316), distance to markets ((-0.712) and soybean price (0.004) were the major determinants that significantly influenced market participation. A total of 114 respondents out of the 182 were found to be soybean market participators and their level of market participation was 72%. Tobit regression model results showed that factors affecting the level of market of participation were age (2.668) farming experience (2.054) household size (2.201) distance to markets (-0.431) extension contacts (1.673) market infrastructure

(0.249) communication device (0.173) cooperative membership (0.290) and use of inoculants (1.239). Poor market access, high cost of fertilizer, delay in planting time and lack of credits were the most important constraints to market participation faced by the women soybean farmers in the study area.

5.2   Conclusion

The probit and tobit regression models were used to identify factors that influence market participation decision and factors that affect level of market participation among women soybean farmers in Hawul local government area. The results show that the main determinants of market among the farmers were educational level, market information, group participation, household size, non farm income and soybean price. The major variables that affected farmers level of market participation were age, farming experience, market infrastructure, non farm income, òwnership of communication device, extension contacts and use of inoculants. Distance to markets and transaction costs both negatively influenced market participation, this is consistent with other past related studies on food crop market participation in various sub- saharan countries. The result indicates that women soybean farmers level of market participation in the study area was 72% showing high market participation rate. The main problems experienced by the women farmers that limits market participation in the study area are poor access to markets and high costs of inputs.

5.3   Recommendations

From the key findings of this study, the following recommendations were made ;

1. Since access to market information significantly influenced Soybean market participation, it is imperative to work on the improvement of farmers access to market information. This could be achieved through strengthening farmer contacts with extension agents, through radio and different posts. Providing timely information on prevailing market prices and costs of inputs would improve farmers income.

2. Government should assist rural women farmers by introducing adult literacy programmes which would expose the farmers to the latest findings and encourage the enrolment of girls in schools.

3. Since distance to the markets and transportation costs were found to negatively influence market participation, there is need to invest in roads, rails and other transport networks.This could be done by improvement of rural roads to enhance efficiency in accessing markets, Lower transportation costs and establishing more markets in farming areas.

4. Strengthen established cooperatives and create more groups in the study area by funding and organizing them by government, non governmental organizations and stakeholders.This will improve farmer knowledge and grant them access to market information. They could enjoy from economies of scale, as this would encourage market participation by farmers.

5. Government should help in facilitation of agricultural services such as access to extension contacts and access to credits among women farmers by establishing microfinance banks that provide softloans.

6. There is need for government and stakeholders to create more poverty alleviating programmes.

7. There is need to create market linkages for women farmers in the area as

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