



WOLKITE UNIVERSITY

**MARKET CHAIN ANALYSIS OF POTATO: IN THE CASE OF
DAMBOYA DISTRICT, KEMBATA ZONE ,CENTRAL
ETHIOPIA.**

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ACRONYMS AND ABBREVIATIONS

ADLI	Agricultural Development Led Introduction
AMA	American Marketing Association
CIP	International Potato Center
CSA	Central Statistical Analysis
DA	Developmental Agency
FAO	Food Agricultural Organization
GDP	Gross Domestic Product
IPMS	Improving Productivity and Market Success
N	Number of respondents
NGOs	Non-Governmental Organizations.
USAID	United States Agency for International Development

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ABSTRACT

This study analyzes the potato market chain in Damboya District, Kembata Zone, Central Ethiopia, with the objectives of identifying key actors and linkages within the chain and examining factors influencing potato supply. Despite the crop's critical role in local livelihoods, the market chain remains fragmented, characterized by inefficiencies such as weak infrastructure, limited market access, and information gaps that hinder smallholder participation. A mixed-methods approach was employed, integrating primary data from 91 producers and 20 traders with secondary sources to assess socio-economic dynamics, and market structures. Results reveal a multi-layered market system dominated by intermediaries, with the Producer → Wholesaler → Retailer → Consumer channel emerging as the most prominent pathway. Key determinants of supply include land availability, proximity to markets, and engagement with extension services, while gender disparities in resource access further influence market participation. The study highlights the importance of addressing systemic barriers to enhance market functionality and equity. By elucidating the interplay of socio-economic and institutional factors, it contributes to broader discussions on agricultural market development in resource-constrained settings. The findings provide a foundation for future interventions aimed at improving market linkages and supporting smallholder resilience in Ethiopia's potato sector.

Keywords: *Potato Market Chain, Market channel , market chain actors , Supply Determinants, multiple liner regresion , Damboya District*

1.INTRODUCTION

1.1 Background

Potatoes originated in the Andes region of South America and were introduced to Europe in the 16th century, eventually spreading to all continents. By the 21st century, they had become one of the world's most important food crops, ranking as the fourth-largest globally after rice and wheat, according to the Food and Agriculture Organization (FAO) in 2022. Over the past two decades, global potato production expanded significantly, from 267 million tons to 375 million tons, driven by their role as an affordable food source for growing urban populations. Major producers include China, India, Russia, Ukraine, and the United States. Potatoes are highly dependable for food security, offering advantages such as higher food production per unit area, greater employment generation, and less susceptibility to speculative commodities trading, as noted by USAID in 2013.

In Ethiopia, agriculture plays a critical role in the economy, contributing over 35% of the annual GDP, 80% of export income, and 75% of job opportunities, as reported by the Central Statistical Agency (CSA) in 2018. Crop production dominates the agricultural sector, accounting for more than 70% of agricultural GDP. The use of improved agricultural inputs, such as seeds, fertilizers, and pesticides, has driven significant progress, with an annual growth rate exceeding 8% (FAO, 2023). Potato production in Ethiopia has seen steady growth, increasing at an average annual rate of 8.2% between 2010 and 2020, according to Tesfaye, Negash, and Bewket (2022). Ethiopia is now the largest producer of potatoes in sub-Saharan Africa, with over 1 million hectares of land under cultivation.

The potato market chain in Ethiopia, which encompasses input supply, production, processing, and retailing, offers significant opportunities for domestic market development. However, challenges such as the lack of quality seeds, poor farm practices, inadequate storage facilities, and limited cooperative capacity hinder its effectiveness (Haggblade et al., 2012; AGRIBiz, 2015). In the Damboya District, agriculture is the primary economic activity, with over 90% of the population engaged

in crop and livestock production. Potatoes are a major crop, with approximately 2,500 hectares under cultivation, as reported by the Damboya District Agricultural Office in 2023. While the district's connection to the main road network facilitates product transportation, challenges such as limited market information, storage facilities, and processing infrastructure persist, constraining the potato value chain. These issues highlight the need for further research and investment to enhance the potato marketing system and support smallholder producers.

1.2. Statements of the Problem

Potato is a vital food and cash crop in Ethiopia, contributing significantly to household income, food security, and rural livelihoods. In Damboya District, Kembata Zone, potato production is an important agricultural activity; however, despite its economic potential, the market chain remains inefficient and underdeveloped. Smallholder farmers face multiple challenges that hinder their ability to access profitable markets, negotiate fair prices, and maximize returns.

One of the primary inefficiencies in the potato market chain is the presence of multiple intermediaries, which reduces the share of profits received by producers. Farmers often sell their produce at unfavorable prices due to limited direct market access. These inefficiencies can limit farmer incomes and affect their ability to participate effectively in the market.

Furthermore, while various studies highlight factors influencing agricultural supply, there is limited empirical research on the determinants of potato supply in Damboya District. Variables such as land size, frequency of extension contact, market price, and household characteristics (age, gender, and income diversification) are likely to play significant roles in shaping farmers' market engagement, yet their specific effects remain unclear in the study area. Identifying effective marketing channels for enhancing farmer profitability and minimizing transaction costs is essential for improving market outcomes.

Given these gaps, a scientific and systematic analysis of the potato market chain is essential to evaluate the factors affecting the quantity of potato supply. This study aims to provide empirical evidence on market dynamics and identify the most

effective channels for enhancing farmer participation and market outcomes. Additionally, the findings will inform policy recommendations and interventions designed to improve market efficiency and foster a more competitive and sustainable potato value chain in Damboya District.

1.3. Objectives of the Study

1.3.1. General Objective

The major objective of the study is market chain analysis of potato in Damboya district.

1.3.2 Specific objectives

- ❖ To identify the market chain actors, their role and linkage in Damboya district.
- ❖ To analyze factors affecting quantity of potato supply in Damboya district

1.4. Research Questions

From the above specific objectives, the following research questions are addressed.

- What were the major potato marketing actors, their role and linkages?
- What are factors affecting quantity of potato supply in Damboya district?

1.5. Significance of the Study

This study was expected to provide empirical and evidence-based findings on the potato market chain and potato marketing efficiency for smallholder households in Damboya district. Thus, exploring the market chain of potato production assisted in setting priorities, providing feedback to research programs and NGOs, and guiding policymakers. It suggested to individuals and development organizations a better understanding of how unhelpful intermediaries could be eliminated, thereby improving marketing efficiency. It also benefited researchers, field extension workers, and other development organizations in making feasible and logical interventions to enhance the benefits of the potato market sector and improve the livelihoods of smallholder households in Damboya district.

1.6 Scope and Limitations of the Study

Scope of the Study

This study focuses on the market chain analysis of potatoes in Damboya District, Kembata Zone, Central Ethiopia. It examines the structure, and efficiency of the potato market by identifying key market actors, their roles, and the major marketing channels. The study also investigates the factors influencing the quantity of potato supply to the market, including socio-economic and institutional variables such as land size, market price, extension services, access to market information, and distance to market.

The research is limited to potato producers, traders, and consumers in the study area, using primary data collected through structured surveys and interviews. A combination of descriptive and econometric analyses is employed to assess the market chain's efficiency and identify challenges affecting farmer participation. The findings of this study are expected to provide policy recommendations for improving the potato market chain and enhancing smallholder farmers' profitability.

Limitations of the Study

Despite its contributions, this study has certain limitations. First, it is geographically confined to Damboya District, which may limit the generalizability of the findings to other potato-producing regions in Ethiopia. Second, data reliability may be affected by farmers' recall bias when reporting past production and market participation details. Third, the study relies on cross-sectional data, which captures market conditions at a specific point in time and may not fully reflect seasonal price variations or long-term trends. Additionally, external factors such as weather conditions, policy changes, and market disruptions were beyond the study's control but could have influenced farmers' production and marketing decisions.

2. LITERATURE REVIEW

2.1.Theoretical review

2.1.1. Concepts and defintions

The potato (*Solanum tuberosum*): is a starchy, tuberous crop plant that is one of the world's main food crops. Potatoes are native to the Andes region of South America and have been cultivated there for thousands of years (Hawkes, 1990). Potatoes are an herbaceous perennial plant that produces edible underground tubers. The tubers are high in starch and are a valuable source of carbohydrates, vitamins, and minerals in the human diet (Spooner et al., 2014).

Market; According to the American Marketing Association(AMA, 2017, a market is "the set of all actual and potential buyers of a product or service" . Investopedia defines a market as "the area of economic activity in which buyers and sellers come together and the forces of supply and demand affect prices" (Investopedia, 2023). Markets can be categorized by various factors such as geography, product type, or customer segment.

Marketing: can be defined as "the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large" (American Marketing Association 2017).

Agricultural marketing: refers to the commercial activities and processes involved in the flow of agricultural products and services from the point of production (the farm) to the point of final consumption by the end user or consumer (Olukosi et al., 2022).

2.1.2. Market Chain Analysis

According to FAO (2005), market chain is defined as a process of following a product from production to consumer, by looking at all points of the chain, prices in and out of each point, functions performed by each point, market demand and supply (trends), market constraints and analyzing the market opportunities for the particular product. Harahap (2009), also defined market chain analysis as a way gaining insight into the:

-

- (1) Operations of specific market channels while focusing on their growth potential,
- (2) Activities and efficiency of actors along the chain,
- (3) Business support services involved,
- (4) Policy and regulatory frameworks.

Using the information from the analysis, opportunities, and constraints can be identified within specific market chains, and ways can be seen to improve a defined client's capacity to compete more effectively.

2.1.3. Market Channels

According to Kotler (2003) marketing channels is a set of interdependent organizations involved in the process of making a product or services available for use or consumption. Most producers do not sell their goods directly to the final users, between them stands as set intermediaries' performing a variety of functions. These intermediaries constitute a marketing channel also called a trader channel or distribution channel.

Producer → Wholesaler → Retailer → Consumer

This was identified as the first and most important market channel in the study area in terms of volume. This channel involves the potato producers selling to wholesalers, who then sell to retailers, who finally sell to the end consumers. This aligns with findings from a recent study by Gebremedhin et al. (2021) on potato value chains in Ethiopia.

Producer → Local Collector → Wholesaler → Retailer → Consumer

This is another important market channel identified, where the producers sell to local collectors, who then sell to wholesalers, followed by retailers, and finally to consumers. Similar multi-tiered channels have been documented by Emana and Gebremedhin (2007) in their analysis of potato markets in Ethiopia.

Producer → Consumer (Direct)

This is a shorter market channel where producers sell directly to consumers, bypassing intermediaries. Direct producer-to-consumer channels have been highlighted as an emerging trend in Ethiopia's potato value chains (Hirpa et al., 2010).

The main marketing actors involved in the potato value chain include:

Producers The potato farmers or growers who are responsible for the primary production of the potato crop. They are the starting point of the value chain, growing and harvesting the potatoes.

Local collectors:These are the intermediaries who collect potatoes from the producers at the local level, often in the villages or near the production areas. They aggregate and consolidate the potatoes before selling to wholesalers.

Wholesalers:The wholesalers are the larger-scale traders who procure potatoes in bulk, typically from the local collectors or directly from producers. They then sell the potatoes to retailers in larger quantities.

Retailers:The consumers are the end-users who purchase and consume the potatoes. They can be households, institutions like schools/hospitals, or businesses like restaurants/hotels. They represent the demand side of the potato market.

Final consumers:The end-users who purchase and consume the potatoes. They can be households, institutions like schools/hospitals, or businesses like restaurants/hotels. They represent the ultimate demand side of the potato market chain

These actors and their roles align with the market channel structures identified in recent studies on potato marketing in Ethiopia (Emana & Gebremedhin, 2007; Gebremedhin et al., 2021).

2.1.4. The Market Efficiency

An efficient market is one, which is capable of moving a product from producers to consumers at market is efficient it will increase market surplus, and induce regional and inter regional trade, which increase the profitability of farming and trading in a short as well as long term period (Amani,2008). Operational and price efficiency is the two most important indicators of marketing efficiency.

Operational efficiency is measured in terms of marketing costs and marketing margins. An important operational efficiency is evident where marketing costs are reduced but outputs are either maintained or actually increased. Therefore, the higher the losses incurred during the operation the lower the level of operational efficiency. Pricing efficiency is concerned with the ability of the marketing system to allocate resources

and coordinate the entire agricultural/food production and marketing process in accordance with consumer directives. Competition plays an important role in determining pricing efficiency, and at the same time adding more utility to the products in order to get more market share (FAO, 2009).

lowest cost consistent with the provision of services that consumers demand (Scarborough and Kydd, 2008). It is assumed that an efficient marketing system is a vital means of raising income levels to both farmers and traders engaging in production and trading (Pinckney, 2008). If the

2.2. Agricultural Marketing in Ethiopia

Agriculture in Ethiopia contributes over 35% of the annual GDP, 80% of export income, and 75% of job opportunities (CSA 2018). From the agricultural GDP, crop production takes the lion's share, which accounts for more than 70%. Due to increasing the use of agricultural inputs (like improved seeds, fertilizers, and pesticides), agriculture showed dramatic progress with an annual growth rate of 8% and over (FAO 2023)

The major constraints include poor infrastructure, lack of market information, limited access to credit, and a large number of intermediaries in the marketing chain (Minot et al. 2015).

The Ethiopian government has made efforts to transform the agricultural sector from a subsistence-oriented to a market-oriented system through the Agricultural Development-Led Industrialization (ADLI) strategy. This has involved investments in infrastructure, the promotion of cooperatives and farmer organizations, and the provision of market information services. However, significant challenges remain in improving the efficiency and equity of agricultural marketing in the country (Minot et al. 2015).

2.3. Production and Marketing of Potato

Potato is an important food and cash crop in the Ethiopian highlands, with production levels ranging from 700,000 to 1 million tons annually (CSA 2022). However, the potato marketing system in Ethiopia faces significant challenges. Studies have found

that farmers receive only 30-40% of the final consumer price, with the majority of the value captured by intermediaries (Emana and Nigussie 2011).

The key constraints in potato marketing include poor market infrastructure, lack of market information, limited access to storage facilities, and the bargaining power of intermediaries (Emana and Nigussie 2011; Minot et al. 2019). Smallholder potato farmers often lack the capacity to grade, package, and transport their produce to major markets, leaving them vulnerable to exploitation by traders.

The Ethiopian government has sought to improve potato marketing through the establishment of farmer cooperatives, the provision of market information services, and investments in rural roads and storage facilities. However, more needs to be done to strengthen the linkages between potato producers and consumers and ensure a fairer distribution of rewards along the value chain (Minot et al. 2019).

2.4. Studies on Potato Market Chain

Some research studies various challenges of potato marketing sector in the country. Jaleta (2007) investigated on the role of markets in the smallholder farmer's resource allocation for subsistence food crops and commercial cash production. Finally, the study results revealed that marketing outlets and lack of local markets to absorb supply, low produce prices, excess of intermediaries, and lack of marketing institutions and coordination among farmers as the major constraints on the marketing of crops in Ethiopia. According to Mulat (2008), the Ethiopian agricultural output markets are characterized by an inadequate transportation network, limited number of traders with inadequate capital and facilities, high handling costs, inadequate market information system, weak bargaining power of farmers, and undeveloped agro-industrial sectors.

The application of value chain analysis in agriculture is growing due to market failure and noncompetitive setting of small scale agricultural production. However, value chain research related to potato is scanty. Most literature and research in the past has focused on potato production and some on marketing. A case study on the potato value chain conducted in Kenya has shown that contract farming can be used to reduce transaction costs and risks, and to improve the organization and governance of value chain by creating stable business relationships (Kirumba *et al.*, 2004). The study also will be indicated that potato value chain is constrained by a number of market

and institutional failures. The potato chain in Kenya is fragmented, characterized by little cooperation and integration, cartels, high transaction costs, deep mistrust..

2.5. Empirical Review

Dawit and Haile Mariam (N.d 2007) stated the importance of horticultural crops for both domestic and international markets as it was at an increasing rate from time to time associated with the expansion of small-and large-scale irrigation facilities compounded by national and regional extension service on the production of horticultural crops. In their paper, they analyzed opportunities and constraints of potato marketing in the rift valley. They reported three options for selling horticultural crops; right in the field sell at nearby markets, and least proportion option to access distance markets. They added that in terms of volume about 93 percent of the total produce was sold to wholesalers.

According to (Chadwick, D2015), even in systems in which cattle manure is available for use, organic fertilizers are very limited and serious nutrient availability problems may still occur. Furthermore, the aim for conventional farming is to provide as many mineral nutrients as the plants need to gain maximal outcome. But organic farming aims to minimize the environmental impact of agricultural production by recycling plant nutrients and organic matter (Ceglie, Francesco G,2014) within the system.

Errebhi *et al.* (Lombardo, S., Pandino2020) stated that potatoes respond to N fertilization very well and that N is usually the most limiting essential nutrient for potato growth for both conventional and organic producers (Vos, 1995; Finckh *et al.*, 2006). There are a range of different results about how potato N fertilization affects yields, There has also been found strong relationship between tuber N and NO₃- concentrations (Saravia, David, et a,l 2016).Fertilization regimes also have an effect on potato tuber diseases.

According to (Wille, L., Messmer, M , 2019) site specific fertilization allows the crops to grow strong and healthy, by making the plants less sensitive to pathogenic organisms. However, the fertilization may contrarily also have a disease favoring effect by enhancing foliar development which is responsible for retaining high humidity, which is needed for the growth of soft rot bacteria for example (Café-Filho,

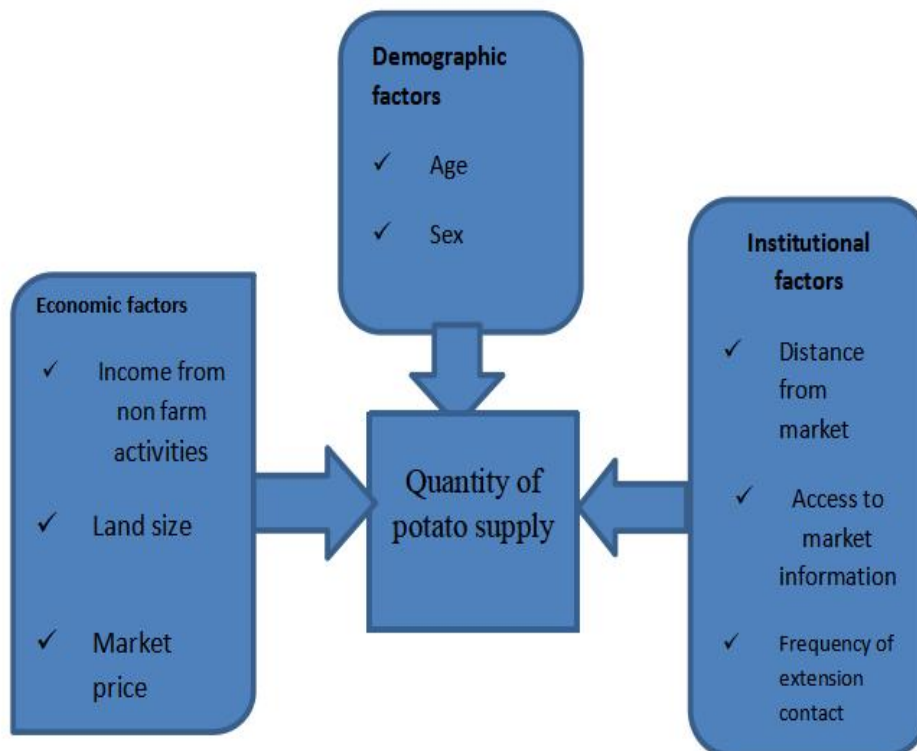
Adalberto C, 2019). Despite some studies that have been made There are still many unanswered questions and controversies between them that need clarification.

A study by (Tafesse, Shiferaw, et al, 2020) in Ethiopia on bacterial wilt finds out that disease are one of the most important factors that contributes to this high yield gap in the country. The same study indicated that mid-altitude areas of the country around Shashamene, Bakko, Jimma and rift valley are most affected by bacterial wilt.

According to (Senthilkumar, K., Rodenburg, 2020), sub-optimal agronomic practices are also the other most important factor contributing to this potato yield gap. Furthermore, the use of local varieties is one and the most important factors which contribute to the low yield of potato in Ethiopia. This is because, the local varieties are susceptible to late blight and of course low yield potential (Assefa, Elias Damtew,2020)

2.6 Conceptual Framework

Figure1. conceptual framework of market chain analysis of potato



3. RESEARCH METHODOLOGY

3.1. Description of the study area

Damboya is one of Woredas in the Central Ethiopia, they have 20 kebeles in Damboya woreda. part of Kembata Zone, Damboya is bordered on the south by Kedida Gamela, on the west by Angecha, on the north by the Hadiya Zone and on the east by the Bilate River which separates it from Alaba. The town Durame is surrounded by Damboya Woreda. Damboya was separated from Kedida Gamela woreda. Based on the CSA, this woreda has a total population of 82,622, of 41,543 are men and 41,079 women, or 9.83% of its population are urban dwellers. The distance from Damboya to Ethiopia's capital Addis Ababa (Addis Ababa) is approximately 411 km/225 mi. The Administrative center of Damboya is Damboya.

The Kembata Zone, where the Damboya district is located, is known for its favorable agro-ecological conditions for potato cultivation. The altitude of this woreda is approximately 1700 m above sea level. The average annual rainfall is 800-1,200 mm and a mean annual temperature is 15-20°C (SNNPR BoA, 2021). These climate conditions are well-suited for the production of various potato varieties.

3.2. Data type, source and Method of Data Collection

The type of data collected for this study included both qualitative and quantitative data from primary and secondary sources. Primary data was gathered through a structured questionnaire-administered survey targeting key market chain actors, including potato producers, wholesalers, and retailers. The questionnaires focused on collecting quantitative data on aspects such as production, marketing channels, and factors affecting the quantity supplied of potatoes.

In addition to the quantitative data, qualitative data was also collected through open-ended questions in the survey, allowing respondents to provide insights into their experiences, challenges, and perceptions related to the potato market. This qualitative data enriched the findings by capturing the nuances of market dynamics and the contextual factors influencing the industry.

Secondary data complemented the primary data collection and was obtained through a review of relevant documents, such as manuals, reports, and books available with the research staff and institutions. This combination of qualitative and quantitative data provided a comprehensive understanding of the potato market chain.

3.3 Method of sampling and sample size

The study adopted a multistage sampling technique to identify and capture data from key groups, specifically potato producers and traders. In the first stage, Yebu and Hego kebeles were selected using simple random sampling methods. For the second stage, a sample size of 91 producers was determined from the total population of approximately 1,000 potato producers in the study area, which includes around 570 producers in Yebu kebele and about 430 in Hego kebele. This sample size was calculated using Yamane's sampling formula at a 90 percent confidence level, represented by the equation

$$n = N / (1 + N (e^2))$$

$$n = \frac{1000}{(1 + 1000(0.1^2))} = 91$$

n= sample size for the research use (91)

N= total number of potato producers in study area (1000 producers)

e= margin of errors at 10% simple random sampling (0.1)

For the trader sample, non-probability sampling techniques were employed to incorporate perspectives from other key market participants. The sampling strategy specifically focused on potato traders, resulting in a total of 20 respondents selected to effectively represent various roles within the potato market chain.

3.4 .Method of data analysis

Both descriptive and econometric analyses were used.

3.4.1 Descriptive statistics

Descriptive such as, percentage, tabulations, figures average, and others for analyzing the data from producers' & traders' of potato marketing survey.

3.4.2 Econometric Analysis

This method of data analysis refers to the use of different economic and statistical tools or models for testing hypothesis related to the objective of the study. In this study the factors that affect the supply of potato to the market are estimated using multiple regression models. This model consists of a dependent variable and independent variable(s) (explanatory) and an error terms which stand for unobservable random variables not explicitly included in the model.

Model specification

As dependent variable, quantity of potato supply is continuous variable the appropriate model is the OLS(Gujarat, 2004).The regression equation takes the form:

$$y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \dots + \beta_nx_n + \varepsilon$$

Where:

y = Dependent variable

x = Independent variable (of there are n)

β_0 = y intercept

β = the slope of the line

ε = error term

In this study, the factors that affect the supply of potatoes to the market were analyzed using multiple linear regression models with ordinary least squares (OLS) estimation. The primary reason for employing the multiple linear regression model was to identify the most important factors associated with the amount of potatoes supplied by producer households in the area, thereby enabling an estimation of how the included variables were related. The estimated coefficients indicated the effect of a change in the independent variables on the dependent variable (Green, 2003).

Dependent variable:

Quantity of potato supply: it is continuous dependent variable in the equation it is measured in quintal and represents the actual supply of potato by farm to the market.

Independent variable :

Age of the household head: It is a continuous variable and measured in years. Aged households are believed to be wise in resource use, on the other hand young household heads have long investment horizon and it is expected to have either positive or negative effect on quantity of potato supply. The expected sign is positive as age one of the parameters of human capital. As an individual stays long, he will have better knowledge and will decide to participate (Gebre et al. 2016),

Sex of the household head: A dummy variable taking zero if female and one if male for variable to be considered. Sign will not be attached with the variable determined that male farmers tended to produce more for market and therefore participated in potato market more than female farmers participate.(Beshir et al. 2012)

Access to market information: Access to market information is assumed to have positive impact on marketable supply of potato. It is a dummy variable with a value of one if a household head has access to market information and zero otherwise. The general idea is that maintaining a competitive advantage requires a sound business plan.(Abebe and Bogale 2014).

Market price: is continuous variable that measured in Birr per kg and expected to influences the quantity supplied by farmers positively. Higher prices lead to increased production efforts,benefiting the farmers.(Mekonnen, D. A.2013)

Income from non/off farming activities: It is continues measured in terms of amount obtained income from off and non-farming activities. This income may strengthen farming activity on one side and may weaken it on the other side. But for this study it was assumed to have inverse relation with quantity of potato supply. (Jaleta et al. 2018)

Frequency of extension contact : It is a continuous variable measured by number of extension contact per year and representing extension services as a source of information on technology. It is expected that extension service widens the household's knowledge with regards to the use of improved technologies and has positive impact on potato supply (Rehima et al. 2013). found that if potato producer gets extension, the amount of potato supplied to the market increases.

Distance to the nearest market: It is the distance of the potato producer households from the nearest market and it is measured in km of walking time. The closer the market, the lesser would be the transportation charges, reduced walking time, and reduced other marketing costs, better access to market information and facilities. In this study distance to the nearest market is affect quantity of potato supply negatively. (Asfaw et al. 2021).

Land Size: This variable is a continuous variable and it refers to the total area of farmland that a farmer owns in hectare. In agriculture, land is one of the major factors of production. It is assumed that the larger the total area of the farmland the farmer owns, the higher would be the output. The availability of land enables the owner to earn more agricultural output which in turn increases the marketable supply (Tiruneh and Culas 2020). Therefore, farm size and marketable supply are expected to have direct relationship.

Table 1: summary of the variable definition

No	Parameter	Type	of measurement	Effect
1	Age of the household head	continuous	Number of years	+ve\ -ve
2	Sex of the household head	dummy	1 or 0(1,if male, 0,otherwise)	+ve\ -ve
3	Land size	continuous	hectare	+ve
4	Market price	continuous	Birr per kg	+ve
5	Income from non/off farming activities	continuous	Birr	-ve
6	Frequency of extension contact	Continuous	Number	+ve
7	Distance to the nearest market	Continuous	km	-ve
8	Access to market information	Dummy	1 or 0(1, if access to market information, 0,otherwise)	+ve

4. RESULT AND DISCUSSION

4.1. Descriptive Analysis of Sampled Households' Characteristics

This part deals with the result and discussion, analysis and interpretation of data collected on potato market chain in the study area. The analysis was undertaken based on information obtained from questionnaires distributed to the sampled respondents and interview. 91 from producers/farmers and 20 from traders .

The data were analyzed using descriptive statistics to describe the socio economic and demographic characteristics of sampled respondents, market chain status of market efficiency and factors affecting quantity of potato supply.

4.1.1 Socio-Economic Characteristics of producers Categorical variables of potato producer

This section of the thesis focuses on the socio-economic characteristics of potato producers and traders. It begins with an examination of the socio-economic traits of potato producers, followed by a discussion of the characteristics of the traders.

Table 2: Categorical variables of potato producer

Variable	Item	Frequency	Percent (%)
Sex	Male	59	64.84
	Female	32	35.16
Access to Market Information	Yes	74	81.32
	No	17	18.68

Source :Own survey result 2025

Sex

The sample includes 91 potato producers, with 59 individuals (64.84%) identified as male and 32 individuals (35.16%) as female. Males represent the larger proportion of respondents, comprising nearly two-thirds of the surveyed population, while females account for slightly over one-third of the total.

Access to Market Information

Among the 91 respondents, 74 potato producers (81.32%) reported having access to market information, and 17 producers (18.68%) indicated no access. A majority of the surveyed population has access to market-related data, with approximately four out of five respondents possessing this resource, compared to a smaller subset lacking such access.

Continuous Variables producer

Table 3: Continuous Variables producer

Variable	Mean	Std. Dev.	Min	Max
Age (years)	38.34	6.99	25	52
Land Size (ha)	2.22	0.51	1.4	4
Income from Non-Farm Activities (Birr)	5521.98	2005.43	1500	9000
Frequency of Extension Contact	2.68	1.10	1	5
Distance to the Nearest Market (km)	8.48	1.95	3	14
Market Price (Birr/kg)	27.85	2.24	22	33

Source :Own survey result 2025

Age of Household Head

The sampled potato producers have a mean age of 38.34 years, with a standard deviation of 6.99 years. Ages range from a minimum of 25 years to a maximum of 52 years, indicating moderate variability across the group.

Land Size (ha)

The average land size cultivated by respondents is 2.22 hectares, with a standard deviation of 0.51 hectares. Landholding sizes vary between 1.4 hectares (smallest) and 4 hectares (largest), reflecting relatively consistent farm sizes among producers.

Income from Non-Farm Activities (Birr)

Non-farm income averages 5,521.98 Birr, with a standard deviation of 2,005.43 Birr. Reported incomes span from 1,500 Birr (lowest) to 9,000 Birr (highest), showing substantial variation in earnings outside agriculture.

Frequency of Extension Contact

Producers report a mean of 2.68 contacts with extension services, with a standard deviation of 1.10. Frequencies range from 1 contact (minimum) to 5 contacts (maximum), suggesting differences in engagement with agricultural support services.

Distance to the Nearest Market (km)

The average distance to the nearest market is 8.48 km, with a standard deviation of 1.95 km. Distances vary widely, from 3 km (shortest) to 14 km (longest), highlighting geographic disparities in market accessibility.

Market Price (Birr/kg)

The mean market price for potatoes is 27.85 Birr/kg, with a standard deviation of 2.24 Birr. Prices fluctuate between 22 Birr/kg (lowest) and 33 Birr/kg (highest), reflecting variability in local market conditions.

4.1.2 Demographic and socio-economic characteristics of sampled traders

Table 4: Categorical Variables (Traders)

Variable	Categories	Frequency	Percentage (%)
Sex	Male	15	75%
	Female	5	25%
Access to Market Information	Yes	15	75%
	No	5	25%
Marital Status	Married	11	55%
	Single	9	45%

Source :Own survey result 2025

Sex

The distribution of respondents by sex indicates that out of a total of 20 individuals, 15 are male, accounting for 75% of the sample. This suggests that the majority of respondents are men. Meanwhile, female respondents represent a smaller proportion, with 5 individuals making up 25% of the total. This difference highlights a gender imbalance within the sample.

Access to Market Information

Access to market information varies among respondents, with a significant majority of 15 individuals (75%) reporting that they have access to relevant market details. In contrast, 5 respondents, making up 25% of the sample, do not have access to such information. This indicates that while most respondents are informed about market trends, a portion still lacks access, which could impact their decision-making and opportunities.

Marital Status

Marital status among respondents shows a relatively balanced distribution, with 11 individuals (55%) being married and 9 individuals (45%) being single. While the majority are married, the difference between the two categories is not substantial, indicating that both married and single individuals are fairly represented within the sample.

Table 5: Continuous Variables (Traders)

Variable	Observ 20	Mean	Std. Dev.	Min	Max
Age (years)		35.11	6.16	25	45
Experience (years)		8.50	4.68	1	16
Household Size		2.75	1.29	1	5
Education Level (years)		4.15	1.98	1	8

Source :Own survey result 2025

Age (years)

The ages of the traders in the sample range from a minimum of 25 years to a maximum of 45 years. The average age is 35.11 years, with a standard deviation of 6.16 years, representing the spread of individual ages around the mean value.

Experience (years)

The number of years of trading experience reported by respondents spans from **1 year** to 16 years. The mean experience level is 8.50 years, accompanied by a standard deviation of 4.68 years, which quantifies the dispersion of experience durations across the group.

Household Size

Household sizes among the traders vary between 1 member (smallest household) and 5 members (largest household). The average household size is **2.75** members, with a

standard deviation of 1.29 members, describing the variability in household composition.

Education Level (years)

The years of formal education completed by traders range from 1 year to 8 years. The mean educational attainment is 4.15 years, with a standard deviation of 1.98 years, illustrating the distribution of education levels within the sample.

4.2 .Market chain actors

The major market players include producers, rural assemblers, wholesalers, retailers, transporters, and consumers. Based on the informal discussion with some of wholesalers, rural assemblers and extension employees of study wholesale buyers who come to Damboya during equivalent amount of the product, the number of retailers in the study area estimated up to 30 on the market day of the district. The large number of retailers was found during the market day of the Woreda. Almost all the retailers had equivalent amount of volume of product handling

Producers-These are the primary or first link actors of the market channel who cultivate and supply surplus potato to the market. The land for the aforementioned commodities was either its own plot, share crop and/or rented to produce the already mentioned crops.

Wholesalers- These are known for purchase of bulky products with better financial and information capacity. They bought potato at the farm gate, from assemblers and/or road side with a larger volume than any other marketing actors does. They relatively spend their full time in wholesale buying throughout the year in and out of the district.

Retailers-These are the final link in the market chain who delivers potato to end users or consumers. Most of retailers have mobile telephone to exchange current information. The working capital of retailers ranges from 3,000 up to 10,000 Birr. Retailers use rented and their own store because some traders store is not found in front of the main road to attract sellers.

Consumers: From the consumers' point of view, the shorter the market chain, the

more likely is the retail price going to be affordable. Consumers are individual households; they bought the commodity for their own consumption only.

4.3. Market Channels

Table 6: Market Channels

Channel	Description	Percentage of Total Potato Marketed	Ranking by Volume
Channel I	Producer → Consumers	18%	3rd
Channel II	Producer → Retailer → Consumers	32%	2nd
Channel III	Producer → Wholesaler → Retailer → Consumers	38%	1st
Channel IV	Producer → Rural Collector → Wholesaler → Retailer → Consumers	12%	4th

Channel I represented 18% of total potato produced were marketed through this channel. The channel was found to be the third important market channel in terms of volume.

Channel II represented 32% of total potato produced were marketed through this channel. The channel was found to be the second most important channel in terms of volume

Channel III represented 38% of the total potato produced were passed through this channel during the survey period. It is the first most important channel in the study area in terms of volume.

Channel IV represented 12% of the total potato marketed volume of potato during the survey period. The channel is the least important potato marketing channel in the

study area in terms of volume.

4.4. Result of Econometric Analysis

4.4.1 Factors affecting quantity of supply of potato

Model Specification and Diagnostic Tests for Reliability

Multicollinearity Assessment (Variance Inflation Factor - VIF)

The Variance Inflation Factor (VIF) values indicate the extent of multicollinearity among independent variables. A VIF value above 10 is generally considered problematic, while values between 1 and 5 suggest moderate correlation but are not necessarily a cause for concern (Gujarati & Porter, 2009).

In this analysis, all variables have VIF values below 2.5, with a mean VIF of 2.01, indicating no severe multicollinearity. The highest VIF is 2.50 for Frequency of Extension Contact, which is well below the threshold of concern. Therefore, multicollinearity is not a significant issue in the model, and all explanatory variables can be retained without introducing significant redundancy.

Heteroscedasticity Testing

The Breusch-Pagan test is used to determine whether the residuals exhibit constant variance (homoskedasticity) or varying variance (heteroskedasticity). The null hypothesis assumes homoskedasticity, meaning the error terms have equal variance.

The test result indicates that the p-value is not statistically significant, leading to the failure to reject the null hypothesis. This suggests that heteroskedasticity is not present, meaning the residuals have constant variance. As a result, the OLS estimates are reliable and valid.

The diagnostic tests also confirm that the model does not suffer from serious multicollinearity or heteroskedasticity, further validating the reliability of the estimated coefficients. These findings support the credibility of the regression results and imply that the model is appropriately specified for further interpretation and policy recommendations

The goodness of fit of the model

R-squared (R^2): The R-squared value is 0.8605, meaning that approximately 86.05% of the variation in the dependent variable is explained by the independent variables in the model. This high value suggests a strong fit of the model to the data.

Adjusted R-squared: The adjusted R-squared value is 0.8469. This metric adjusts the R-squared for the number of predictors in the model, providing a more accurate measure of fit when multiple variables are included. While slightly lower than the R-squared, it still indicates a good model fit

Table 7: factors affecting quantity of supply of potato

Source	SS	Df	MS	Number of obs	=	91
		F(8, 82)	=	63.25		
Model	43.6136825	8	5.45171031	Prob > F	=	0.0000
Residual	7.06763623	82	.086190686	R-squared	=	0.8605
		Adj R-squared	=	0.8469		
Total	50.6813187	90	.563125763	Root MSE	=	.29358

Source;stata result :2025

Variable	Coef.	Std. Err.	t	P>t	[95% Interval]	Conf.
Age	0.0199883	0.0062247	3.21	0.002	0.0076055 0.0323712	
Sex	0.1698605	0.0810052	2.10	0.039	0.0087153 0.3310057	
Land Size	0.3304001	0.0937979	3.52	0.001	0.1438061 0.5169941	
Income from Non- Farm Activities	-0.0000874	0.0002226	-0.39	0.696	-0.0005302 0.0003554	
Frequency of Extension Contact	0.2293463	0.0442819	5.18	0.000	0.1412556 0.3174371	
Distance to Nearest Market	-0.0485195	0.0182398	-2.66	0.009	-0.0848042 -0.0122348	
Market Price	0.031825	0.0081887	3.89	0.000	0.0155351 0.048115	
Access to Market Information	0.1913827	0.1099334	1.74	0.085	-0.0273098 0.4100752	
Constant	1.288451	0.2851989	4.52	0.000	0.7210995 1.855802	

Source;stata result :2025

This study examines the factors influencing the quantity of potato supply (measured in quintals) among farmers. The findings reveal that several variables have significant

effects on production decisions, while others exhibit no statistically meaningful relationship.

Age of the Farmer

The results indicate that the age of the farmer has a positive and statistically significant impact on potato supply ($\beta = 0.0199$, $p = 0.002$), significant at the 1% level. This suggests that older farmers tend to supply more potatoes, likely due to their accumulated farming experience, enhanced decision-making capabilities, and superior agronomic knowledge. Prior research supports this assertion, indicating that farming experience plays a crucial role in optimizing production efficiency and risk management (Barrett et al., 2017).

Sex of the Farmer

The sex of the farmer is another key determinant, exhibiting a positive and statistically significant relationship with potato supply ($\beta = 0.1699$, $p = 0.039$). This finding suggests that male farmers, on average, supply more potatoes than female farmers. The disparity could stem from differences in access to productive resources such as land, capital, and labor. Studies have consistently shown that women in agriculture face systemic barriers, including limited land ownership and restricted access to extension services, which can adversely affect their production potential (Doss, 2018; FAO, 2011).

Land Size

The size of landholdings (measured in hectares) is strongly associated with increased potato supply ($\beta = 0.3304$, $p = 0.001$), indicating that for 1 additional hectare of land, potato supply increases by approximately 0.3304 units. This statistical significance at the 1% level suggests that larger farm sizes enable greater production output, possibly due to economies of scale, better resource allocation, and mechanization. Previous studies have highlighted that land size is a key factor in agricultural productivity, as larger plots facilitate greater investment in technology and inputs (Feder et al., 2010). Policies aimed at securing land tenure and promoting efficient land use could further enhance productivity among farmers (Jayne et al., 2014).

Frequency of Extension Contact

The frequency of extension contact, measured by the number of interactions between farmers and extension agents, has a highly significant positive effect on potato supply ($\beta = 0.2293$, $p < 0.001$). Farmers who receive regular extension services tend to produce more potatoes, likely due to increased access to technical knowledge, improved farming techniques, and better management practices. This finding aligns with previous studies that emphasize the importance of extension services in improving agricultural productivity and technology adoption (Anderson & Feder, 2007). Strengthening extension programs and ensuring equitable access could further enhance productivity, particularly for smallholder farmers.

Distance to the Nearest Market

The distance to the nearest market (measured in kilometers) is negatively associated with potato supply ($\beta = -0.0485$, $p = 0.009$). This statistically significant at the 1% level, result indicates that for each additional kilometer from market centers, potato supply decrease by 0.0485 . The decline in supply is likely due to high transportation costs, post-harvest losses, and limited access to timely market information. This finding aligns with existing literature, which highlights that poor rural infrastructure and high transaction costs discourage smallholder market participation (Fafchamps & Hill, 2005). To counteract these challenges, policy interventions aimed at improving rural road networks and reducing transportation costs could enhance market accessibility, ultimately increasing agricultural commercialization and productivity among farmers.

Market Price

The market price of potatoes exerts a positive and highly significant effect on supply ($\beta = 0.0318$, $p < 0.001$). This result is consistent with economic theory, which suggests that higher prices provide a strong incentive for farmers to increase production. Studies have shown that price stability and favorable market conditions are critical in shaping farmers' production decisions, particularly in contexts where price volatility affects profitability (Bellemare & Barrett, 2013). Policy measures that stabilize prices, strengthen farmer cooperatives, and improve market linkages could further encourage production expansion.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study on the potato market chain in Damboya District provides critical insights into the structure, key market actors, major marketing channels, and factors influencing the quantity of potato supply. The findings indicate that the potato market involves multiple intermediaries, including producers, local collectors, wholesalers, retailers, and consumers, each playing a crucial role in the movement of potatoes from farms to final buyers. Among the four identified marketing channels, the most dominant is the Producer → Wholesaler → Retailer → Consumer pathway, accounting for 38% of the total marketed volume. This suggests that wholesalers have a significant influence on pricing and market efficiency. However, several inefficiencies, such as high transaction costs, inadequate infrastructure, limited access to market information, and weak farmer bargaining power, reduce profitability and limit the benefits farmers derive from the market.

The econometric analysis reveals that factors such as land size, frequency of extension contact, and market price have a positive effect on potato supply, indicating that farmers with larger landholdings, better access to extension services, and favorable prices are more likely to supply higher volumes of potatoes. Conversely, distance to the market negatively impacts supply, suggesting that poor road infrastructure and high transportation costs limit farmers' market participation. These findings underscore the urgent need for strategic interventions to improve the efficiency of the potato market chain. Expanding agricultural extension services can improve farmers' knowledge of modern production techniques, value addition, and market strategies, while supportive policies can help regulate intermediaries, ensure fair pricing, and promote better coordination among market participants.

Addressing these challenges through a holistic approach will contribute to a more efficient and competitive potato market chain, leading to higher incomes for farmers,

reduced post-harvest losses, and overall economic growth in the district. Improved market access and enhanced farmer participation will not only strengthen the agricultural sector but also play a vital role in ensuring food security and sustainable rural development in Damboya District and beyond.

5.2 Recommendations

- **Enhance Agricultural Extension Services** ; Increasing the frequency of extension contact for farmers is crucial. Strengthening extension programs through regular training sessions and field visits will equip farmers with modern farming techniques, ultimately improving productivity.
- **Improve Land Access and Utilization:** Supporting farmers in optimizing land use is essential. Implementing land tenure reforms to secure land rights and promoting efficient land use practices will enable farmers to invest in better inputs and technologies, thereby increasing potato production.
- **Stabilize Market Prices:** Ensuring fair and stable prices for potato farmers will encourage market participation. Establishing mechanisms for price stabilization, such as cooperative marketing platforms, can help reduce price volatility and support farmers in increasing their supply.
- **Facilitate Market Access:** Reducing the negative impact of distance to markets on supply is vital. Investing in rural infrastructure, particularly roads and transportation facilities, will enhance market accessibility, lower transportation costs, and encourage timely market participation.
- **Promote Gender Equity in Agricultural Resources:** Addressing disparities in production between male and female farmers is necessary for overall market improvement. Developing targeted programs to enhance women's access to resources such as land, credit, and extension services will empower female farmers and contribute to increased supply

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7. Appendix

Respondant Quationary Wolkite University, College Of Agriculture And Natural
Resource Department Of Agricultural Economics

Questionnaire for Potato Producers

Section 1: Demographic Information

1. Age of the household head: _____ years
2. Sex of the household head:
 1. Male
 2. Female
3. Household size: _____ members

Section 2: Production Information

4. How many hectares of land do you cultivate for potatoes? _____ hectares
5. What is your average annual potato production? _____ quintals
6. What agricultural inputs do you use? (e.g., fertilizers, pesticides)

Section 3: Income Information

7. What is your monthly income from non-farm activities? _____ Birr
8. What types of non-farm activities do you engage in? (e.g., trade, crafts, services)

Section 4: Market Access and Participation

9. How do you sell your potatoes? (Select all that apply)
 1. Direct to consumers
 2. Local collectors
 3. Wholesalers

4. Retailers

10. What is the average price you receive for your potatoes? _____ Birr/kg

11. Do you have access to market information?

1. Yes
2. No

12. How often do you contact extension services?

1. Never
2. Once a year
3. 2-5 times a year
4. More than 5 times a year

Questionnaire for Potato Traders

Section 1: Demographic Information

13. Age of the trader: _____ years

14. Sex of the trader:

1. Male
2. Female

15. Marital Status:

- Single
- Married

16. Years of experience in trading: _____ years

17. Household Size: _____ members

18. Years of Education : _____

Section 2: Trading Practices

19. Where do you source your potatoes from? (Select all that apply)

1. Local farmers
2. Wholesalers
3. Other traders

20. What is the average price you pay for potatoes? _____ Birr/kg

21. How do you sell your potatoes? (Select all that apply)

1. Direct to consumers
2. Retailers
3. Markets

Section 4: Market Information

22. Do you have access to market information?

1. Yes
2. No

Table 2: Categorical variables of potato producer

Variable	Item	Frequency	Percent (%)
Sex	Male	59	64.84
	Female	32	35.16
Access to Market Information			
	Yes	74	81.32
	No	17	18.68

Table 3: Continuous Variables producer

Variable	Mean	Std. Dev.	Min	Max
Age (years)	38.34	6.99	25	52
Land Size (ha)	2.22	0.51	1.4	4
Income from Non-Farm Activities (Birr)	5521.98	2005.43	1500	9000
Frequency of Extension Contact	2.68	1.10	1	5
Distance to the Nearest Market (km)	8.48	1.95	3	14
Market Price (Birr/kg)	27.85	2.24	22	33

Demographic and socio-economic characteristics of sampled traders

Table 4: Categorical Variables (Traders)

Variable	Categories	Frequency	Percentage (%)
Sex	Male	15	75%
	Female	5	25%
Access to Market Information	Yes	15	75%
	No	5	25%
Marital Status	Married	11	55%
	Single	9	45%

Table 5: Continuous Variables (Traders)

Variable	Observ 20	Mean	Std. Dev.	Min	Max
Age (years)		35.11	6.16	25	45
Experience (years)		8.50	4.68	1	16
Household Size		2.75	1.29	1	5
Education Level (years)		4.15	1.98	1	8

Table 6: Market Channels

Channel	Description	Percentage of Total Potato Marketed	Ranking by Volume
I	Channel Producer → Consumers	18%	3rd
II	Channel Producer → Retailer → Consumers	32%	2nd
III	Channel Producer → Wholesaler → Retailer → Consumers	38%	1st
IV	Channel Producer → Rural Collector → Wholesaler → Retailer → Consumers	12%	4th

```

. vif
+-----+-----+
| Variable | VIF | 1/VIF |
+-----+-----+
| Frequency | 2.50 | 0.400471 |
| Landsize | 2.42 | 0.413937 |
| Marketprice | 2.15 | 0.464686 |
| Incomefrom | 2.08 | 0.480571 |
| Age | 1.98 | 0.504594 |
| AccesstoMa | 1.94 | 0.515896 |
| Sex | 1.71 | 0.585356 |
| Distanceto | 1.32 | 0.755920 |
+-----+-----+
| Mean VIF | 2.01 | |
+-----+-----+

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Table 7: factors affecting quantity of supply of potato

. reg Quantityofpotatosupply Age Sex Landsize IncomefromNonOffFarmingActi FrequencyofExtensionContact DistancetoNearestMarket AccesstoMarketInformation ma

Source	SS	df	MS	Number of obs	=	91
				F(8, 82)	=	63.25
Model	43.6136825	8	5.45171031	Prob > F	=	0.0000
Residual	7.06763623	82	.086190686	R-squared	=	0.8605
				Adj R-squared	=	0.8469
Total	50.6813187	90	.563125763	Root MSE	=	.29358

Quantityofpotatosupply	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Age	.0199883	.0062247	3.21	0.002	.0076055 .0323712
Sex	.1698605	.0810052	2.10	0.039	.0087153 .3310057
Landsize	.3304001	.0937979	3.52	0.001	.1438061 .5169941
IncomefromNonOffFarmingActi	-8.74e-06	.0000223	-0.39	0.696	-.000053 .0000355
FrequencyofExtensionContact	.2293463	.0442819	5.18	0.000	.1412556 .3174371
DistancetoNearestMarket	-.0485195	.0182398	-2.66	0.009	-.0848042 -.0122348
AccesstoMarketInformation	.1913827	.1099334	1.74	0.085	-.0273098 .4100752
marketpricea	.031825	.0081887	3.89	0.000	.0155351 .048115
_cons	1.288451	.2851989	4.52	0.000	.7210995 1.855802