FACTORS AFFECTING PRODUCTION AND MARKET SUPPLY OF SPICES, THE CASE OF ANDERACHA DISTRICT IN SHEKA ZONE, ETHIOPIA

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ABSTRACT

Diverse ecologies available in Ethiopia allow existence and production of many spices or adaptation of exotic spices easily. There is no Ethiopian dish without spices ingredient. Spice production in Ethiopia is not yet developed enough to supply sustainable volumes and quantities. Therefore, the major concern of this study was to determine the major factors that hinder the production and market supply of spices in Sheka zone Anderacha District. For this study, the primary data were collected from 140 randomly selected spice grower farmers / households by using semi-structured questioner. In addition secondary data were collected from different organizations. Descriptive statistics such as mean, average and percentage were used to describe socio-economic characteristics of the respondent. Moreover a multiple linear regression was employed to analyze factors affecting the market supply of spice in the study area. A total of six explanatory variables were found significant. These were current price, distance to market, family number, information to market, extension service and price of related commodities. Therefore, consideration of these factors is vital as it provides information for spice producing farmers and traders in the study area in planning spices production and marketing decision. Moreover, it would provide information for potential investors in spice marketing. Farther more, it also helps the concerned bodies (government organization and nongovernmental organization) regarding policy planning in spice production and marketing in the study area.

Keywords : Spices, marketing, production, sheka zone

1. INTRODUCTION
1.1. Background

Spice forms an important group of agricultural commodities, which since ancient times, have been considered indispensable for flavoring foods. Some are used in pharmaceutical; perfumery, cosmetics and several other industries, and other possess colorant, preservative, antioxidant, antiseptic and antibiotic properties. The value of spices for human nutrition has been over valued in the past as healthy giving effects. They stimulate the eye, nose, and tung and thus stimulate the flow of saliva or starch digestion therefore; the effect on their digestibility of food cannot be in questioned. They also stimulate secretion of enzyme in the stomach and small intestine system for protein and fat digestion.

Ethiopia is a home land for many spice and stimulants such as korarima (Aframomum korarima), long pepper (piper species), gesho (Rhamnus prinoides), black cumin (Nigela sativum), Bishops weed or `Nech azmud' ,Coriander (coriandrum sattivum), sesam (sesamum incum), Chat (Catha edulis) and coffee. The country is also secondary center for many others plant spices. Besides, in south, southwestern, western and southern part of Ethiopia all exotic spices are grown due to favorable climatic condition. For these reasons spices namely `inslal' (Anethum spp), `mitmita' (Capsicum species), `besobila' (Ocimum species), `gesho',korarima, and thyme grow in wild, in garden and on small plots in the homesteads. Inset, chat, korarima, ginger, and other spices are also cultivated in wet region. Wild ginger is also abundant in many areas. Most of spices are highly aromatic because of high percentage of essential oils presents in different part of the plant. The history of spices use in Ethiopia is ancient and dated back to the history of Queen Sheba and king Solomon mentioned in the Bible (Edossa Etissa, 1991).

Generealy, Anderach district is one of the potential areas where different types of spice are produced in sheka zone of the south nation nationality peoples and region in southern part of the country. Due to its suitable air condition, different types of spices are growing by farmers in this district. So that, the main aim of this study is to determine the main factors that hinder the production and market supply of spice products in the study area.

1.2 Statements of the problem

Spices have major stake in the production system and in the foreign earnings of the country. Spices have great role in transforming farmers as producers for market instead of producing merely for subsistence (Dessalegn, 2015). Spices are important additives to Ethiopian dishes. The production and use of spices in Ethiopia go back to time immemorial. Ethiopia has become one of the largest consumers of spices in Africa. People use spices to flavor bread, butter, meat, soups, and vegetables. They also use spices to make medicines and perfumes (International Trade Centre, 2010). Ethiopia is a homeland for many spices, such as korarima (Aframonum korarima), long red pepper, black cumin, white cumin /bishops weed, coriander, fenugreek, turmeric, sage, cinnamon, and ginger (International Trade Centre, 2010).

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255

The country cultivates several indigenous common and exotic spice crops since ancient time. Spice crops are produced in various regions of the country and predominantly by smallholder farmers as a cash crop traded primarily in domestic markets. The spice cultivation has an immense potential for economic development and poverty reduction through creation and expansion of employment opportunities and distribution of income and foreign exchange earnings.

However, except pepper (Capsicum annum), spice crops cultivation is traditional, with no or very little research and extension support. Furthermore, the status of spice production and marketing in the country is not well documented. Currently, there is a growing demand for organic spices in Europe, USA and Japan for food coloring, cosmetics, pharmaceuticals, essential oil derivatives and textile industries. The majority of spices produced in Ethiopia (80%) are consumed domestically. But at the same time, export of spices is developing, which fetches increased foreign exchange earnings. Ethiopia exports specifically ginger and turmeric in the whole form even if importers (Tiru et al East African Journal of Sciences Volume 11 (1) 27-36 28) prefer ginger to come in sliced form (International Trade Centre, 2010). Ethiopia also exports, to a limited extent, extracts of ginger, hot pepper and turmeric to Europe for food coloring and flavouring (Vijayalaxmi et al., 2014). In 2009, Ethiopia exported 15,000 Mts of spices with 11 million USD earnings (International Trade Centre, 2010). Despite the vast scale of utilization and foreign exchange earnings from spices and Ethiopia's comparative advantage for producing and exporting spices to foreign markets, little research and extension attention has been given to the production and utilization of spices (International Trade Centre, 2010; Dessalegn, 2015). The production and marketing of most spices in the country seems under the expected level due to several reasons. Sheka Zone is one of the potential areas for production of different types of spices. Therefore the basic intention of this research is, to assess the major factors that affect the production and marketing supply of spice product in Sheka zone the case of Anderacha district.

1.3 Objective of the Study

The objective of this study is to know different main factors that affect the production and marketing supply of spices in Sheka zone, the case of Anderacha district.

1.4 Significance of the study

The result of the study would be helpful for spice producing farmers and traders in the study area in planning spices production and marketing decision. Moreover, it would provide information for potential investors in spice marketing. Farther more it also helps the concerned bodies (government organization and nongovernmental organization) regarding policy planning in spice production and marketing in the study area.

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256

2. LITRETURE REVIEW

The spice, sub-sector earns low annual export revenue as compared to the exceptional quality and wide variety of the produce which could grow in the various agro-climatic zones of Ethiopia.

Revenue amounting to 8.775 million USD was secured over the last Ethiopian fiscal year [July 8, 2016- July 7, 2017] from the sub-sector. The two preceding consecutive fiscal years also saw 6.473 Million USD and 2. 560 million USD respectively, affirmed Eyoel Legesse, Fruit Vegetable and Spice Processing Industry Director with the Ministry of Industry.

Though the revenues seem to show an upward trend over the years, the amount is still very low for a country that grows at least 50 of the 109 varieties of spices which the International Organization for Standard (ISO) lists, a 2014 research by Addisu Alemayehu indicates.

Yet, the country's topography allows various unique flavors of spices, herbs and aromatic produce. To anyone's amusement, the country's topography could help grow spices of the same species with unique and distinct flavors.

Countries with favorable agro-climatic zones like Ethiopia are reaping the blessings of the sector being competitive both in the international and domestic markets. A single Indian leading spice global trader, for instance, secures over 4.6 billion USD annually. And Vietnam which started developing the sector three decades ago has been registering a crowning achievement. "Currently annual production surged to 140,000 metric tons spices which was only 4,000 metric tons before three decades. Actually, Vietnam has diverted its focus to the spice sector while a fluctuation occurred in the world coffee market.

Experts suggest that various measures have to be taken to earn more from the spice sector.

Addisu Alemayehu, a spice researcher, perceived the spice sector's strategy should target varieties that are most tradable at a competitive price besides boosting product and productivity. Highlighting that Food, Beverage and Pharmaceutical Processing Industry Development Institute is working towards this end, Eyoel Legesse Fruit Vegetable and Spice Processing Industry Directorate Director at the Ministry of Industry adding that spice growers, processors and traders also needs to forge stronger link among themselves to supply quality produce both to global and domestic markets. In addition, creating defined market system would also be important in linking spice growers, processors and traders in a well coordinated manner. He also observed that the government and investors' awareness on the developmental boon of the sector is limited.

Private investors could have massively tapped the enabling economic policy, attractive incentive- which includes tax holiday and favorable financing options- and supports to acquire land, had they been well aware of the advantages of the sector. Likewise, the industrial (for instance dyeing, food preservative and pharmaceutical), export and environmental (promote deforestation for it could be intercropped) paybacks could have led to an aggressive promotion of the sector by the latter. "Research firms, government departments dedicated to the sector and other pertinent bodies have, therefore, tasks ahead of them in creating optimal awareness on the enabling situation for the production and marketing of spices, herbs and aromatic plants.

Producing competent human power to boost research undertakings on the sector is no less important. However, in the absence of any course on spices in the country, the generation of innovative practices may be hampers.

Three types of spices: Chili, Capsicum and Black Pepper are traded largely and account more than 44 percent of the global market or 16 billion USD. So, if Ethiopia aspires to earn and benefit more from the sector, it has to focus on increasing production and exporting of these three products through developing a strategy and upgrading its agricultural extension (Addisu.)

He also suggests the formulation of policies and regulations on marketing, standard of produce, certification and human power development. The government should also implement the ten-year Spice Development Strategy (2015-2025).

In addition, due attention should be given to processing, manufacturing and packaging to get the best out of the sector, he adds.

Dr. Dejen Gebremeskel is Owner and General Manager of Dejen General Exporter that has been engaged in the sector for over eight years. For him, lack of standard products, suppliers and competent companies are additional setbacks. Moreover, the spice value chain has also been facing challenges from less informed brokers.

Of course, the private sector should devise innovative mechanisms to tackle the problem. In this regard, we have embarked up on contract farming agreement with farmers which marks the end of brokers' reign at the top of the value chain.

Dejen affirms that the global spices' market has shown a raising demand which is good news to potential emerging suppliers. Thus, spice growers and processors that have been long engaging in the sector, and those who aspire to engage have the opportunity to earn their fair share by strategizing production, he adds

For his part Addisu said that Tepi Agricultural Research Center has released two best Black Pepper varieties which are better competitive than Indian and Vietnamese ones. Melkassa Agricultural Research Center has also developed capsicums and chili varieties and distributed to farmers.

On top of this, the government has decided to set up an independent coffee, tea and spice research institute, he discloses.

Furthermore, Spice Production, Processing and Marketing Initiative has been made effective. The Initiative is aimed at supporting both smallholder and commercial growers by providing services which make them produce good quality spices. It also avails technical and financial assistances to processors, while helping traders, mainly exporters, through creating international market linkage, Eyoel adds.

Accordingly, Ethiopia has been earning 28 million USD only from Ginger per annum exporting fifty two percent to Sudan, but if it was exported to European countries, meeting EU standards, the revenue could have been tripled or doubled.

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258

Research based spice production, formulating appropriate curriculum for the sector, and raising pertinent bodies' awareness would top off the sector making the country better competitive in the global spice market, the experts agree.

Role of spices in the livelihoods and forest conservation.

Availability of diverse climate and soil types in Ethiopia enabled growth of several indigenous spices, herbs, medicinal and essential oil bearing plants, and also by the same case different exotic spices could adapt easily and give yield. While the diverse agro-ecologies of the country invite production of spices, herbs, medicinal and essential oil bearing plants, research on these huge plant spices still needs to be strengthened.

Utilization of spices, herbs, medicinal and essential oil bearing plants in Ethiopia is very high. According to central statistical report, the total area occupied by spice crops alone excluding the naturally grown indigenous spices is estimated to be hectares. Even if research on these plant spices has not been strengthened and yield and quality not improved as expected, they contributed high values for improving economy of the producers. Most of them are directly or indirectly in daily dietary of each household. Besides, some reports including that the country earned considerable foreign exchanges from export of some of the spic3 crops, which are also as primary raw materials for local industries to produce essential oil, oleoresins and others, which would have otherwise been imported at expense of hard currency. In 1998 GC the primary product of spice (1,934,872 kg) and its oleoresins (67,491 kg) have been exported and the country earned birr 9,670,700 and 16,539,900 respectively (Girma Hailemichael 2004). Moreover, spices and herbs are highly utilized for medicinal uses in addition to dietary role. These plant species are available in sufficient amount that most households have easier access and their traditional preparation method is exercised by each farmer everywhere without the need of complex machine establishment. Ethiopia is said to be a country of origin of cultivated plants, as the mountain part of the country have been and are still primary and/or secondary centers (center of diversity)with a breeding ground landraces of many cereals, pulses, oil crops, herbs and medicinal and essential oil bearing plants (Wageningen, 2008).

National spices research team of Ethiopia, with limited capacity achieved several results on germplasm enhancement, crop management, post-harvest handling and quality management on spices. Lowland spices and highland seed spices were given special research attention. Performances of most of these spices were proved promising in yield and quality. From evaluation, two black pepper, two ginger, one cardamom, one turmeric, one vanilla, three black cumin, three coriander and three fenugreek varieties had been registered or released and promoted to their respective agro ecologies. The average yield of lowland spices was proved promising. While yield of seed spices such as black cumin, coriander and fenugreek ranged from 1.5 to 1.7t/ha. Quality parameters were also promising except in turmeric, cardamom and vanilla that require further improvement. Studies on planting time, multiplication methods, management practices as well as harvesting and processing techniques had also been conducted and important information recommended. Multiplication and distribution of planting materials of spices had already been underway in the past for the released

varieties. The devastating case of ginger bacterial wilt has also been an urgent issue in the research. However, special attention had recently been given for the use of modern tissue culture for rapid multiplication and dissemination of disease-free planting materials of elite materials of the various spices (Girma 2016).

The area under spice cultivation in Ethiopia varied between 330,000 ha and 500,000 ha in the period 2005–2013. Total spice production increased from 238,000 MT in 2005 to 418,000 MT in 2013. Chillies, ginger, black cumin, black cardamom and turmeric were responsible for 97% of the national annual average spice production volume in the same period. The SNNP, Oromia and Amhara regions contributed respectively 37%, 32% and 25% to the average annual spice production during the period 2010–2014. Crops produced in these regions mainly comprise chillies, ginger, black cumin, black cardamom, turmeric, fenugreek, black pepper and coriander. The SNNP region is the main producer of ginger, turmeric and black cardamom, while the Oromia and Amhara regions are chiefly responsible for production of chillies and black cumin. So far Ethiopia isn't recognized as a major exporter of spices, and the contribution of spices to the national economy is low. Agricultural exports primarily comprise coffee, chat, pulses and oilseeds. These crops accounted for 55% of the total export value of US$ 1.7 billion in 2013, whereas spices represented 0.8% of the total export value. Spice exports in 2013 and 2014 amounted to 15,000 MT per annum, representing a value of US$26 million. Ginger was the most exported spice, and was responsible for nearly 50% of total export value. Chillies came in second, followed by turmeric and black cumin. Exports of ginger will almost entirely disappear in 2015, because of the bacterial wilt disease. The majority of spices exported from Ethiopia finds its way throughout Africa. In 2014 the continent was responsible for 66% of the total export value, whereby the Sudan and South Sudan took the lion's share of 54% of total export value. Yemen and Saudi Arabia are the main trading partners in the Middle East, which account for 12% of total exports. The Far East is responsible for the off-take of 20% of exported spices, predominantly in India and Indonesia. A limited volume of 2.5% finds its way to Europe (Herms S. 2015).

3. RESEARCH METHIDOLOGY

3.1 Description of the Study Area

The research was conducted in Anderacha wereda which is found in Sheka zone of South Nation Nationalities and People Regional Government. The wereda is bordered with Ilubabr in North West, Kefa in east, Bench Maji in south and Gambela in south west. It is located at a distance of 655km from Addis Ababa. It has 10,303 total number of population. Altitude above sea level is 900-2500 meter, where as the mean annual temperature is 21.9 degree Celsius and annual rain fall is 1800-2000mm. It has a conducive climate, adequate rain fall, perennial rivers flowing throughout the year. Fertile land is available in the area and about 75% of it, is cultivated. The agricultural activities carried out in this district are coffee plantation, spice production, crop horticulture, cattle fattening, apiculture, animal farming and flower production. More over social and other services available are health, education, restaurants and hotels.

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260

3.2 Sampling Techniques

For this research purpose a two stage sampling techniques was employed. In the first stage the major spice producing kebeles were purposively selected. There was 15 kebeles in the wereda, from those 8 Kebeles were purposively selected which have a good potential in spice production. In the second stage 140 households were randomly selected from 8 Kebeles using Yamane, 1967 formula and distributed proportionately in all 8 kebeles.

3.3 Method of Data Collection

Both primary and secondary data were used for the study. Primary data were obtained from the selected households by using semi-structured questioner. In addition to questioner personal observation was also used to cross-check the data obtained through questioner survey. The secondary data were acquired from relevant office such as woreda agriculture and rural development, NTFP, different books, internets and other documents.

3.4 Methods of Data analysis

In this research descriptive statistics and multiple linear regressions were employed for the data analysis of factors affecting the supply of spices production in the study area as shown in the following multiple linear regression model.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots\cdots + \beta_n X_n + U_i \text{ -------------------------------------- (1)}$$

Where,
Y= dependent variable
β_0= is the intercept
$X_1, X_2\cdots\cdots X_n$=explanatory variables
$\beta_1, \beta_2\cdots\cdots \beta_n$=slope of the equation in model
U_i=the random term
In case of this study SUP is dependent variable and CP, DTM, FN, ITM, ES, PRC are independent (explanatory) variable. The model is as follows;

$$SUP = \beta_0 + \beta_1 CP + \beta_2 DTM + \beta_3 FN + \beta_4 ITM + \beta_5 ES + \beta_6 PRC + \beta_7 TL + \beta_8 EL + \beta_9 Tr + U_i \text{-------------------(2)}$$
Where;
SUP= Quantity of spices supplied in kg
CP= Current price of spice in Birr/kg
DTM= Distance to market in km
FN= Family number
ITM= Information to market
ES= Extension service
PRC= Price of related commodity in Birr/kg
TL = Total land size
EL + Education level
Tr = Training

3.5 Variable Definition and Working Hypothesis

Theoretically, it is commonly known that when the price of the product is increased, producers are interested to take their product to the market. This makes the supply to be directly related to the current market price. Prices of other crops produced in the farm are expected to influence the supply of products negatively. This means out of two related commodities when the price of the first commodity increase and the price of the second commodity remain the same, the supply the first commodity will get increase and the supply of the second commodity will decrease.

It is expected that there is negative relationship between distance to market and market supply. This implies that, if the distance between the farmers' residence and the market place is longer, the farmer will be discouraged to produce enough amounts of spice products.

Extension service plays a great role in extending research finding to farmers and in achieving development goal more effectively. The government uses different facilities helps to improve the skills knowledge of farmers thereby, enabling them to make good decision. So that, it is expected to influence production supply positively.

Household with large number of family members have sufficient potential for field work than those who have less number of family members. This great potential of working power result in high production which increase supply. Therefore family number is directly related to the supply of production.

The farmers who have access to market information are more likely to produce large amount spice when the price of spice is high and produce small amount of products when the price is lower than those sample farmers who have no access to market information. Therefore, there is direct relationship between supply and market information.

4.   RESULTS AND DISCUSSION

This chapter deals with the analysis of the survey data and interpretation of the analytical findings. As already noted, a semi-structured questioner was administered to 140 sample households and field observations were carried out.

4.1. Socio-Economic Characteristics of Sample respondents

The demographic characteristics of spice growing farmers include sex, religion, education level and age of the sample respondents. The deep discussions for socio-economic characteristics of sample respondents were revealed below.

Table 1. Distribution of sample farmers by sex group

Sex	Number of farmers	Percent
Female	32	22.5
Male	108	77.5
Total	140	100

Source: survey result, 2010.

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262

As shown in Table 1, about 77.5 % of the sample households were males and the rest 22.5% were females. Regarding their religion, 87.5% of the sample households were protestant and 12.5% were Orthodox (Table 2).

Table 2. Distribution of sample households by religion

Religion	Number of farmers	Percent
Orthodox	18	12.5
Protestant	122	87.5
Total	140	100

Source: survey result, 2010.

The survey result also showed concerning education status of sample households, 25% of sample households could read and write. This was better status as compared to the percentage of those who were illiterate which is 12.5%. The rest, 30%, 17.5% and 15% attended 1-4 grades, 5-8 grades and 9-12 respectively (Table 3).

Table 3. Distribution of sample household heads by education level

Education level	Number of farmers	Percent
1-4 grades	42	30
5-8 grades	25	17.5
9-12 grades	21	15
Able to read and write	35	25
Illiterate	17	12.5
Total	140	100.00

Source: survey result, 2010.

The survey result indicated that the average age of the sampled spice grower is 39.47 years. In general terms, the majority of sample spice grower farmer falls under age group of (20-60). Only 7.5% of them are above 60 (Table 4). Though the family size differs across the household, it was observed that the average family size of spice grower were 6.

Table 4. Distribution of sample farmers by age group

Age of traders	No. of Traders	Percentage
20-30	52	37.5
31-40	35	25
41-50	25	17.5
51-60	17	12.5
Above 60	11	7.5
Total	140	100

Source: survey result, 2010

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263

4.2 General pattern of spice production and marketing

The most dominant spices cultivated in this woreda are Cardamom and Long paper. From 140 sampled households 82% of the farmers were cultivating only Cardamom, while the rest 18% were cultivating both Cardamom and Long paper but there was no farmer who cultivate only Long paper. Most of the sampled farmers who did not cultivating Long paper were using naturally growing or forest Long paper both for commercial and consumption propose. As most of the sampled household explained the main target of cultivating spice was for consumption next to income generation.

Relatively, areas under spice cultivation of sample households were increased starting from 1999EC. This is due to close follow up and assistance of extension agents which were employed by both office of NTFP project and the woreda agricultural office. There was also training given by NTFP project concerning spice production. Before 1997E.C most households use forest spices rather than domesticating or cultivating spices on their farm land due to lack of awareness. But after NTFP project start work on this woreda, most farmers begin cultivation of spices on their farm land. Later most households become understand that spice production is the easiest and the best way of improving household income when compared with other agricultural products like coffee and honey. All spice producer sample households use oxen for spice cultivation.

Spice producers soled their product directly to consumers and traders. As shown on table 5 below, 55% and 7.5% of sampled farmers soled their spice product to the nearby market and far market respectively. While the rest 37.5% soled to very far market, around 40km far from their residence. Concerning selling price fairness 92.5% of the sampled farmer responded the price was faire but the rest 7.5% responded it was not.

Table 5. Distribution of sample households by distance to market

Distance to market	Number of farmers	Percent
Nearby	77	55
Far	11	7.5
Very far	52	37.5
Total	140	100

Source: survey result, 2010.

As most sample households revealed the major problems that hinder spice production and marketing was lack of family labor to cultivate spices together with other crops, lack of oxen, lack of enough farm land and unavailability of means of transport together with low infrastructure. Fluctuation of spice price and far distance market was also another factor that hinders the production and marketing of spices on the study area.

4.3 Determinants of spice Supply

Production and consumption are known to influence supply of spice because each of these determinants has its own contribution to supply of spice by producers to the market. Because

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264

everything produced is either to be consumed or supplied to the market or to be stored for future time. Hence, a simple linear regression model was constructed to study the relationships between the determining factor of supply and the total spice supplied to market. The factors considered to influence the supply of spice were: the current price, price of related commodities, extension service, education level, distance to the market, total land size, training, family number and information to market. Results of the regression analysis are presented in Table 6 below and the inferences drawn from the result are discussed below.

Table 6: Regression results of spice supply model

Variables	coefficients	t. value	significance level
Current price	2.241	3.591	0.001***
Price related commodities	3.125	-1.866	0.072*
Extension service	6.501	2.037	0.051*
Education level	0.435	1.336	0.192
Distance to the market	-1.423	-3.633	0.001***
Total land size	-1.418	-1.573	0.126
Training	-2.951	-0.964	0.343
Family number	1.302	3.106	0.004***
Information to market	5.222	2.528	0.017**
Constant	32.211	1.329	0.194
R^2	0.841		

Note: Dependent Variable – the total spice supplied to market in kg

***, ** and * indicates significant at 1%, 5% and 10% probability level respectively

Source: Own data analysis

4.4 General discussion of the significant explanatory variables

As shown on the table 6 above, Out of the nine explanatory variables hypothesized to influence the supply of spice, six were found to be statistically significant. The regression model shows that current price, distance to the market, family number, information to market, extension service and price related commodities were important factors influencing the supply of spice in the study area. More specifically, the current price, distance to the market and family number were statistically significant at 1% probability level. Only information to market was statistically significant at 5% level of significance. The variable, extension service, price related commodities were statistically significant at 10% probability level. On the other hand, the coefficient of three explanatory variables, namely, education level, total land size and training were less powerful in explaining the supply of spice of the sample households.

4.4.1 Inferences from the model estimation

The summary of the regression result showed that the goodness of fit of the model was at more than 84%, which was sufficient to explain the interaction of the variables on dependent variable.

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265

Current price (CP)

As indicated in the table 6, the current price of spice significantly and positively affect the supply of spice at 1% probability level. The coefficient of current price was 2.241. This means, as the price of spice increase by one birr the quantity of spice product supplied to market increase by 2.241 amounts. In other words, the supply is sensitive to price offered by buyers. Here, producers checked the price of spice for their best benefit and this led the determinant to be significant at 1% level.

Distance to the market (DTM)

The model result show that distance to the market is one of the main important factor that determinants the supply of spice in the study area. More specifically, this variable was significant at less than 1% probability level. This variable is negatively associated with the supply of spice with the coefficient of -1.423 in the study area. The implication of this negative relationship is that if the distance between the farmers' residence and the market place is longer, the farmer will be discouraged to produce enough amounts of spice products.

Family number (FN)

The model result show family number was positively correlated with the supply of spice with coefficient of 1.302. This means as the number of family increase by one the supply of spice also increase by 1.302 amounts. This is obvious to conclude as the number of family increase the working power of the family also increase which result in high supply of products. To mention the result of analysis of this study, family number is significant at 1% probability level, this means family number highly significant to explain the quantity supplied of spice.

Information to market (ITM)

This variable has a significant and positive influence on the supply of spice at the coefficient of 5.222. This variable was significant at 5% probability level. The possible explanation is that those sample farmers who have access to market information are more likely to produce large amount spice when the price of spice is high and produce small amount of products when the price is lower than those sample farmers who have no access to market information.

Extension service (ES)

The regression model result shows that this variable is positively and significantly associated with the supply of spice in the study area. Its coefficient was 6.503 and this positive effect of the extension service on the supply of spice implies that farmers who have regular contacts with extension agents tends to produce more spice products than those who have less contact with extension agents. This variable was significant at 10% probability level.

Price of related commodities (PRC)

Price of related commodities also influenced the supply of spice to the market significantly. It was correlated negatively with dependent variable with coefficient of 3.125 and significant at 10 % probability level. The possible explanation for this negative relation is that as the price of related commodities increase by one birr, the supply of spice decrease by the amount of 3.125.

5.   CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Supply of agricultural commodities is characterized by many factors, which are linked to both natural and manmade events. This makes difference for the agricultural commodities than non agricultural commodities to entertain the natural and artificial happenings. The consequence of the interaction of the above events determines supply of the commodity to the market by producers. In analyzing supply of agricultural commodities including spices to market it is necessary to consider the events from production of these commodities up to arrival to market.

Each step is further confronted with its own influencing factor. This leads to emerging of the main determining factors of supply of the agricultural commodities to the market.

As to this study, based on the results obtained through analysis and observed features, it is possible to conclude that the supply of spice was most of the time linked to the current price, distance to market, family number and information to market. Extension service was also affecting the situation of supply besides the above determinants. Hence, each producer has to be aware of these conditions before deciding to produce and supply spices. Concerning efficiency of marketing and marketing problems, producers should minimize their cost of marketing or maximize the value of a commodity. From side of producers, many aspects have been justified how to produce and make ready an agricultural commodity especially spices based on analysis of the realistic data obtained. But it is not by itself an end to sustain the status for long time. Therefore there should be some measures that have to be taken either by the producers themselves or the responsible body (from side of the government) to make production and marketing smooth.

5.2 Recommendation

In accordance with the analysis made, the nature of the sector, the status of the producers, and problems faced in production and marketing of spice, generally, the following measures are recommended to be taken by the concerned policy makers.

1. Results of the regression analysis showed that current price had a significant influence on the quantity of spice supplied. Hence, there is a need to consider the price support policy for spices to boost the quantity of spice marketed by the spice producers. Moreover, developing a market information system about agricultural commodities markets in general and about spices market in particular would help the spice producers in making marketing decisions.

2. Results of the regression analysis also showed that distance to market had a significant influence in the supply of spice. Hence, efforts must be taken to provide the access of market for spice producers around their home town.

3. Extension service is another factor that influences the supply of spice significantly. Hence woreda agricultural office should employ sufficient number of development agents.

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267

4. Yet another problem expressed by spice producer farmers was transportation. Hence, with the general interest of the public, transport infrastructure in the study area has to be improved which is also expected to benefit the spice producer farmers in moving their products.

5. Majority of sample farmers reported that there is the shortage farm land to supply enough amount spices. To solve these problems the local government should take appropriate measure.

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269