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Review Article

Review on Economic Efficiency of Smallholders Farmers in the Production of Sesame: The Case of Ethiopia

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Abstract: The objective of this study is to review economic efficiency of smallholder farmers in sesame production in Ethiopia. Specifically, the review examines levels of Technical, Allocative and Economic efficiencies of sesame producer; and to review factors affecting efficiency of smallholder farmers in the study area. For this study both published and unpublished sources were used. Also, the study reviewed various functional forms that were fitted to estimate Technical, Allocative and Economic efficiencies levels and model that were fitted to estimate factor affecting efficiency of smallholder farmers. The review results indicate Cob-Douglas function and Translog functional form are alternative methods for evaluating efficiencies and were used for purposes of comparison; OLS is mainly used if the inefficiency scores are not truncated or censored for a specific value; Tobit regression approach is preferred over the OLS regression in the case of censored data. The review results indicate as there is a room to increase the efficiency of sesame producers. Variables such as non-farm income and credit access, experience in sesame production, distance of sesame farm from residence, education level and extension contact had major significant impact on Technical, Allocative and Economic efficiency. In order to improve efficiency of smallholder farmers in sesame production in Ethiopia, give consideration to the above mentioned socio economic and institutional factors is needed. Focusing on efficient use of existing resources and addressing the socio-economic and institutional factors by using existing technology and given input levels are crucial and relevant policy issues are recommended. Strengthening the existing livestock production system, credit access, agricultural extension system and invest in the provision of basic education to smallholder farmers are advisable.

Keywords: Efficiency, Smallholder Farmers, Sesame

1. Introduction

1.1. Background of the Study

The world population is 7.7 billion in year of 2017; Out of this 80% of the world's poor, live in rural areas and work mainly in farming. Agricultural development is one of the most powerful tools to end extreme poverty. Oilseed crops are high value agricultural commodity and play a prominent role in agricultural industries and trade throughout the world. Sesame is an important oilseed crop grown across the globe for the valuable edible oil and due to its economic value [42]. The world produces about 4.5 million ton of sesame seeds every year on an average. India and China are the top sesame producing countries in the world. About 60 to 65 countries produce these seeds out of which Asian and African countries are the key sesame seeds producers. Almost 55 percent of the world sesame production is now in Africa, while 42 percent is in Asia. The largest sesame importer in the world is Japan. China is the world's second largest sesame importer [36].

Africa is an agrarian continent whereby two thirds of the people directly or indirectly their livelihood based on agriculture. The Sub-Saharan Africa region accounts for more than 950 million people, approximately 13% of the global population [20]. Sesame is one of the key agricultural commodities in a number of sub-Sahara African countries. Sudan is the largest producer of sesame in Africa, with more than 2.1 million hectares of production area while Ethiopia is the largest sesame exporter in Africa [34].

Ethiopia economy depends on agricultural sector. The agriculture sector in Ethiopia plays pivotal roles in economic growth, poverty alleviation, employment creation, foreign

exchange earnings and food security. Agriculture contributes about 36% of GDP, accounts 80% of total employment and contributes 83.9% of exports. The Government of Ethiopia has identified increasing productivity of smallholder farms and expanding large-scale commercial farms as two of its priority areas [35].

Sesame is one of the key agricultural commodities grown in Ethiopia, and the most significant contributor to national economy. It is second largest foreign exchange earnings next to coffee. In addition, it uses as source of income for millions of population ([22, 13, 17]). Northern and north western parts of country are areas where sesame seed is widely produced ([20, 22]). Humera, Gondar and Wollega type sesame seeds are varieties produced in country that are well known on the world market. Humera and Gondar are mainly suitable for bakery and confectionery purposes, while Wollega sesame has a major competitive advantage for edible oil production because of its high oil content [10].

During 2015/16 production year, sesame was produced on an area of 0.388 million ha of land with a total production of 0.2742 million ton, and the average productivity were 0.706 ton/ha [14]. Also during 2016/17 production year sesame was produced on an area of 0.337 million ha of land with a total production of 0.2678 million ton and the average productivity were 0.794 ton/ha. The total cultivated land, total output produced and average productivity during 2017/18 were 0.37 million ha, 0.256 million ton and 0.691ton/ha respectively. This means the total productivity of sesame yield was less or reduced in production year of 2017/18 [15]. Sesame seed produced during 2016/17 production year by different regional state of Ethiopia indicated as following. In Amahara regional state total area of cultivated land, total production produced and average productivity was 0.163 million ha, 0.1466 million ton and 0.899 ton/ha respectively. In Benishangul Gumuz region total area of cultivated land, total production produced and average productivity was 0.029 million ha, 0.0022 million ton and 0.777 ton/ha respectively. In Oromia regional state the total area of land, total output produced and average productivity was 0.036 million ha, 0.0279 million ton and 0.775 ton/ha respectively. This average productivity was low when relative with other region of Ethiopia [15].

Farm productivity can be increased through additional use of inputs and technology, efficient use of the existing resources and addressing the socio-economic and institutional factors. New technology and increasing input used are costly in Ethiopia. Focusing on efficient use of existing resources and addressing the socio-economic and institutional factors by using existing technology and given input levels are crucial and relevant policy issues. Furthermore, there is limited review research which has been conducted on economic efficiency of smallholder farmers in this study area so far. Therefore, this study focuses on review level of efficiency and identifies factors that affect efficiency in the study area.

1.2. Statement of Problem

Agricultural sector in Ethiopia is dominated by small-scale farmers, subsistence oriented, low input and low output. The problems of small-scale agriculture include the use of traditional technology of low productivity, shortages and poor distribution of agricultural inputs [5].

Sesame is one of the key agricultural commodities grown in Ethiopia and the most significant contributor to national economy. Ethiopia is one of top ten sesame producer and second largest sesame exporter in the world. Out of total oil seed, sesame seed accounts 33% in terms of production and 90% in terms of exports. The country produced sesame mainly for international market. The country has many opportunities in sesame production such as, availability of cultivation land, irrigable area, labor and varietal diversity. Also, Sesame is currently the country's principal export oilseed and is mainly raised by small scale farmers. So, it is an opportunity for smallholder farmers to produce sesame and improve their livelihood. Despite its opportunities, there is still the inefficiency of the smallholder farmers in the production of sesame due to some problems that hinder its productivity [1].

The productivity of sesame varieties is low relative with other crops. Also, Sesame is grown mainly in developing countries by smallholder farmers who rarely apply fertilizer. This results in both low yield and poor economic returns [39]. The Ethiopian sesame production is essentially full of challenges. Despite the potential for improving the production and productivity of the sector, it is believed that the producers lack the necessary input to improve their production and productivity; trade arrangements are not well organized; the necessary government policies and institutions, and the enforcement of regulations are either non-existent or functioning too ineffectively to ensure a smoothly operating [37]. Despite the increasing demand and price of sesame in the world market, its productivity is declining from 800 to 300 kg/ha in most parts of the country. The major reasons are the lack of knowledge and skill in land preparation and agronomic practices, weather uncertainties and pest outbreaks. It is thus, anticipated that availing information on improved agronomic practices, weed and pest management will undoubtedly increase sesame production and productivity [40]. So, to meet the domestic and foreign needs of the country, increasing production and productivity of the sesame seed is needed. This may be achieved through improved crop management, particularly use of high yielding and disease resistant varieties coupled with improving the existing level of farmer's efficiency.

Moreover, the integration of modern technologies with improving level of efficiency needed for improving productivity. Low production and productivity are the characteristics of several sesame farmers in the country, which needs the specific focus of researchers to measure economic efficiency of sesame and identify factors influencing productivity of sesame. In Ethiopia, sesame is a major cash crop and it takes the lion share in terms of the extent of production, number of producers and area coverage relative to other major cereals grown. However, its production was owned by small holder, a farmer which produces only to

survive their livelihood. So, it is crucial to increase their volume of production and efficiency. In particular, little review had been conducted in the area of economic efficiency of sesame production in the study area. The extent, causes and possible remedies of inefficiency of smallholders are not yet given due attention. Therefore, this study attempts to conduct a review research on the economic efficiency of smallholder farmers in sesame production to guide policy decisions, device appropriate interventions and integrated efforts to overcome inefficiency problem of sesame producer in study area.

2. Review of Literature

2.1. Concept and Definition of Efficiency

2.1.1. Production Efficiency

The transformation of inputs into outputs is the primary purpose of the firm. The functional relationship between inputs and outputs is generally described as the production function, f(x) which shows the maximum output obtainable from various input vectors. Production function can be expressed in several functional forms such as linear, polynomial, Cobb-douglas and Translog functional forms. Production function holds that it gives the maximum possible output which can be produced from given quantities of a set of inputs. The production function may also be referred to as a production frontier if it describes the highest level of outputs achievable from every level of inputs [7].

Cost function, $C(y,w) \equiv min_x\{w'x|f(x) \geq y, x \geq 0\}$ gives the minimum level of cost at which it is possible to produce some level of output, given input prices, which shows the minimum expenditure required to produce output y at input prices w. Profit function, $\pi(p,w) \equiv max_{y,x}\{py - w'x|f(x) \geq y, x \geq 0, y \geq 0\}$ gives the maximum profit that can be attained, given output price and input prices, which shows the maximum profit available at output price p and input prices w [23].

2.1.2. Efficiency and Inefficiency

The amounts by which a firm lies below its production frontier and the amount by which it lies above its cost frontier can be regarded as measures of inefficiency. Efficiency that says that a production unit is fully efficient, if and only if you cannot improve any input and output without reduce any other input or ou

tput. Inefficient, if it can produce the same output reducing at least one of the inputs or if you can use the same inputs to produce more outputs. A producer is efficient if his/her goals are achieved, and inefficient if he/she falls below his/her goal [19]. Efficiency is measured by comparing the observed output against the feasible (frontier) output [24]. Productive efficiency is the ability of organizations to produce output at minimum cost. Efficiency measures based on the observed standard are relative in the sense that individual production organizations are compared with the performance of their peer groups. The observed standard is determined by those production organizations sharing a common technology that produce the greatest output from a given input set. As the performance of the peer group changes, so will measured efficiency. Deviations in output or cost from these frontiers can be used as measures of productive efficiency [45]. A production frontier explains the current state of technology in an industry. Firms in that industry would presently be operating either on that frontier, if they are perfectly efficient or beneath the frontier if they are not fully efficient [11].

According to Russell and Young, the analysis of efficiency focuses on the possibility of producing a certain level of output at lowest cost or producing the optimal level of output from given resources [37]. Efficiency is measured by comparing the actually attained or real value of the objective function against what is attainable at the frontier [21]. Measures of productive efficiency derived from frontier production functions are directly related to the assumed causes of output variation [3].

The efficiency of a firm, that consists of two types, technical and allocative efficiency [21]. These two measures are then combined to provide a measure of total economic efficiency. According the study conducted by Barros overall efficiency can be decomposed into two multiplicative components of allocative efficiency and technical efficiency [8]. Economic efficiency is the degree of ability of a farmer to produce a given level of output at least cost. Economic efficiency may be divided into allocative and technical efficiencies [21].

2.1.3. Technical Efficiency

Technical efficiency refers to the ability of a firm to produce as much output as possible with a specified level of inputs, given the existing level of technology. Technical efficiency concerns the method through which physical quantities of inputs are changed into physical quantities of output. Producers are said to be technically efficient if they achieve maximum feasible output from inputs [11]. According Farrell indicated that, technical efficiency is the proper choice of production function among all those actively in use by farmers. A farm is technically efficient if it produces the maximum obtainable level of output from a certain amount of inputs, given its technology [21]. A farm is considered technically more efficient compared to other farms if it produces a larger output from the same quantities of inputs [21]. Measurement of technical efficiency can be specified as output actually produced divided by maximum output technically feasible [3]. Technical inefficiency can be defined as the quantity by which a firm lies below its production frontier. Once the frontier is known, simply comparing the efficiency level of the firm relative to the frontier can help to know inefficiency of any specific firm [21]. The firm is more inefficient, when it is more distant far (gap) from the frontier. Therefore, the frontier must be constructed first from the production and cost available observations, to determine the efficiency level of the firm [23]. Technical inefficiency is costly; both to the producing unit under investigation and the society at large [19]. Consider a firm employing n inputs $x \equiv (x_i...,X_n,)$, available at fixed prices $w \equiv (w_1,w_2,...w_n) >0$, to produce a single output Y that can be sold at fixed price p>O. Efficient transformation

of inputs into output is characterized by the production function f(x), which shows the maximum output obtainable from various input vectors. Let us now suppose that the firm is observed at production plan (y^o, x^o)**.** Such a plan is said to be technically efficient if $y^o = f(x^o)$, and technically inefficient $if\ y^0 < f(x^o)$. Note $y^0 > f(x^o)$ is assumed to be impossible. One measure of the technical efficiency of this plan is provided by the ratio $0 \leq y^0/f(x^o) \leq 1$. Technical inefficiency is due to excessive input usage, which is costly, and so $W'x^o \geq C(y^0, W)$. since cost is not minimized, profit is not maximized, and so $(Py^0 - W'x^0) \leq \pi(P, W)$ [23].

2.1.4. Allocative Efficiency

Allocative efficiency is the ability of a firm to use the inputs in optimal proportions, given their respective prices. A firm is allocatively efficient if production occurs in a sub-set of economic boundary of the production possibilities set which satisfies the firm's objectives. The location of this subset is determined by the prices faced and the goal pursued by the firms. Allocative efficiency refers to the appropriate choice of input combinations. A farm is allocatively efficient if production inputs are allocated according to their relative prices. Consequently, price or allocative inefficiency results from suboptimal input combinations [21]. Let us now suppose that the firm is observed at production plan (y^o, x^o)**.** Such a plan is said to be allocatively inefficient if, $fi(x^0)/fj(x^0) \neq Wi/Wj$ assuming f to be differentiable. Allocative inefficiency results from employing inputs in the wrong proportions; which is costly and so $W'x^0 \geq C(Y^0, W)$.

2.1.5. Economic Efficiency

According to Barros, technical efficiency refers to the ability of a hotel to obtain maximal output from a given set of inputs with reference to a production function, while allocative efficiency refers to the ability of a hotel to use the inputs and outputs in optimal proportions, given their respective prices. These two measurements are combined to provide the measurement of total economic efficiency. Economic efficiency combines both technical and allocative efficiencies. It refers to the proper choice of input and products combination according to their price relation or the ability of the firm to maximize profit by equating marginal revenue product of inputs to their respective marginal costs. The firm is both technically and allocatively efficient, If $w'x^0 \geq c(y^0, w)$ this difference may be due to technical inefficiency alone, allocative inefficiency alone, or some combination of the two [8].

2.2. Review of Empirical Studies on Efficiency

2.2.1. Studies Outside Ethiopia

The study examined the economic efficiency of smallholder farmers in coffee production: The case of Mathira District, Kenya. The study was based on the cross-sectional data collected through structured questionnaires which were administered to farmers sampled through systematic sampling procedure. The study was used Data Envelopment Approach model in the first stage which computes economic efficiency analysis. Also the study was used Tobit model in the second stage to identify factor affecting efficiency level of farmers. The study result indicated that smallholder farmers in study area were inefficient in coffee production. According to the study result the mean score of technical, allocative and economic efficiencies were 89, 50 and 45% respectively. According to the estimated result showed that the economic efficiency was significantly and positively influenced by the level of education, access to extension services and the age of the household head. Also, economic efficiency was significantly and negatively influenced by non-farm activities and access to credits. The study also highlighted SFA as an alternative method to calculation of efficiency in agriculture though DEA was used in this study [29].

One of the key research work reviewed in this study was by Abu which examined productive efficiency among sesame farmers in Nasarawa State, Nigeria. The study used a two-step analysis. Cobb-douglas stochastic frontiers production analysis was used in the first stage to calculate technical, allocative and economic efficiency. Tobit regression was used in the second stage to identify factors that influence technical, allocative and economic efficiency. Since this study is also on sesame efficiency measurements for smallholder farmers, it was considered that the same tools may be appropriate for the study [2].

Also, Muhammad examined production efficiency among micro-credit and non-credit smallholder Maize growers in Nigeria by use of data envelopment analysis [45], and in another related study, Bradley examined technical, allocative and economic efficiency of rice production in Arkansas. The study was used data envelopment analysis [9]. Generally, the review results concluded DEA and SFA are alternative methods for evaluating efficiencies and were used for purposes of comparison. The stochastic frontier analysis approach has been preferred over DEA. SFA is employed when the single output is produced by multiple factors of production, but DEA is appropriate for multiple inputs that are producing multiple outputs. The study indicated that SFA was appropriate tool since that it allows for estimation of standard errors and tests of hypotheses [11].

Ibrahim E Estimated the level of technical, allocative and economic efficiency of Sorghum and Millet production for small scale farmers in traditional rain fed, North Kordofan State, Sudan by use of SFA approach. The average economic efficiency was 39 percent for Sorghum and about 15 percent for millet suggesting considerable room for productivity gains for the farms in the sample through better use of available resources given the technological structure. The study also established that improvements in educational and extension services would lead to more efficient production in Sudan [28].

2.2.2. Studies Within Ethiopia

The study was undertaken in Selamago district, southern Ethiopia. An objective of the study was to measure the levels of technical, allocative and economic efficiencies, and identify factor affecting efficiency level of sesame producers. The study was based on the cross-sectional data collected in

2011/12 production season from 120 randomly selected farm households. The study was used SFA with Cobb-douglas production function to analyze efficiency level. Also the study was used Tobit model to identify factor affecting efficiency level of farmers. The study result indicated that smallholder farmers in study area were inefficient in sesame production. The production of sesame was positively and significantly affected by labor and seed. According to the study result the mean score of technical, allocative and economic efficiencies were 67.1, 67.25 and 45.14% respectively. Technical efficiency was positively and significantly affected by Soil fertility, non-farm income and credit access. Experience in sesame production, distance of sesame farm form residence, non-farm income and extension contact was negatively and significantly affected allocative efficiency. A variable such soil fertility, non-farm income and credit access has positive and significant impact on economic efficiencies [31].

The Study carried out on measuring technical, economic and allocative efficiency of maize production in subsistence farming of Rift Valley of Ethiopia. According to the estimated result showed that the mean technical, allocative and economic efficiency were 84.7%, 37.47% and 31.62% respectively. According to the estimated result showed education was found to determine allocative and economic efficiencies of farmers positively while the frequency of extension contact has positive relationship with technical efficiency and it was negatively related to both allocative and economic efficiency. Credit was also found to influence technical and economic efficiency positively and distance to market affect technical efficiency negatively. Soil fertility was among significant variables in determining technical efficiency in the study area [33].

In another related study, [38], examined technical, allocative, and economic efficiency among smallholder farmers in maize; the case of Southwestern Ethiopia. The study estimates, technical, allocative and economic efficiency using a parametric stochastic frontier production function (Cobb-Douglas). Inefficiency effects are modeled in a second stage applying a two-limit Tobit regression model. The results show that the mean technical, allocative and economic efficiency score was found to be 62.3, 57.1 and 39%, respectively, indicating a substantial level of inefficiency in maize production. The result depicted that important factors that affected technical, allocative and economic efficiency are a number of family size, level of education, extension service, cooperative membership, farm size, livestock holding and use of mobile**.**

Desale G examined technical, allocative and economic efficiencies and identify source of inefficiencies among large-scale sesame producers in Humera district of western Tigray. The conducted study was used SFA with Cobb-douglas functional form. According to the study result the mean score of technical, allocative and economic efficiencies were 71, 90 and 64% respectively. According to the estimated result showed that technical, allocative and economic inefficiencies was significantly and positively influenced by the level of education, frequency of farm visit, experience in sesame production, type of road and credited amount obtained. Also, technical and economic inefficiencies were significantly and negatively influenced by distance of farm from residence, ownership of living home and livestock ownership and cooperative membership [13].

The study conducted by Hika on economic efficiency of smallholder farmer's sesame producer in Babo-Gambel district of West Wollega Zone. The study was used SFA with Cobb-douglas production function and Tobit model to analyze efficiency level and factor affecting efficiency level of farmers respectively. The study results indicate there is inefficiency in sesame producer in the study area. [27].

The Study conducted on economic efficiency of smallholder farmers' wheat production in Abuna Gindebarat Oromia regional state. The study used stochastic frontier approach with Cobb-douglas function to assess efficiency level of wheat producer. According to the conducted study, there is presence of inefficiency in wheat production in the study area. [4].

The study conducted on economic efficiency of smallholder farmers maize production in Gudeya Bill district of Oromia region. The conducted study used the stochastic frontier with cob-Douglas functional form to assess efficiency level. They found a mean technical, allocative, economic efficiency were score of 71.65%, 70.06% and 49.89%, respectively. The study result indicates there was substantial amount of inefficiency in maize production in the study area. The study results stated that education levels, family size, farm size, frequency of extension contact, uses of credit and participation in non-farm activities has a significant positive effect on technical efficiency. Livestock holding and participation in non-farm activities has positive effect and distance of maize plot from home were found to has negative effect on allocative efficiency while education levels, family size, uses of credit, extension contact and participation in non-farm activities were found to has positive effect and distance of maize plot from home is negative influence on economic efficiency [41].

Endriase G examined productivity and efficiency analysis of smallholder maize producers in southern Ethiopia used Translog functional form and Wudineh examined technical efficiency of smallholder wheat farmers: The case of Welmera district, Ethiopia ([43, 18]. The study conducted by using Translog functional form and two limits Tobit model to analyze efficiency level and factor affecting efficiency level of smallholder farmers respectively [13].

In another related study, Getachew W examined economic efficiency of smallholder farmers in barley production in Meket district, Ethiopia. The study was used Translog functional form and Ordinary Least Square (OLS) to analyze efficiency level and factor affecting efficiency level respectively [26]. However, according to the study conducted by ([13, 31, 33, 38, 27, 4, 41]) two limit Tobit model was appropriate to analyze factor affecting efficiency level over OLS. Also, according to Getachew, Tobit regression approach is preferred over the OLS regression in the case of censored data. OLS regression also needs to ignore the censoring nature of the dependent variable or exclude the censored data from

analysis [26]. Therefore, using Ordinary Least Squares (OLS) regression leads to serious specification errors in model structure and yields biased and inconsistent parameter estimates. Furthermore, multiple linear regression models can be applied only if the efficiency scores do not assume both or either of the upper and lower limits [13].

However, based on the available data set, when there was no value of efficiency score of one for some observations that shows the farmers are fully efficient or the value of zero for some observation which shows that they are inefficient. Tobit model cannot be applied in any efficiency analysis without censored or truncated values of efficiency scores for some observation. Therefore, ordinary least square estimation technique is applicable. But, when a variable is censored, OLS will yield inconsistent, inefficient and biased estimates because it underestimates the true effect of the parameters by reducing the slope. The coefficients of the explanatory variables become very small which shows the weak relationship between the dependent and independent variables. OLS is mainly used if the inefficiency scores are not truncated or censored for a specific value. If the observation tends to be grouped close to the frontier with only a relatively small number in the extreme range, the error distribution will be highly skewed and the maximum likelihood estimator should be expected to be highly efficient than OLS.

Generally, the review results concluded that among the possible algebraic forms, the most popularly used functional forms in many empirical studies of agricultural production analysis are Cobb-douglas and Translog functional forms. Cob-Douglas function and Translog functional form are alternative methods for evaluating efficiencies and were used for purposes of comparison. Many researchers argue that Cobb-douglas functional form has an advantage over the other functional forms. The Cobb-Douglas production function model have advantages over the other functional forms by its assumption like unitary elasticity of substitution, constant elasticity of production and constant factor of demand. Moreover, the Cobb-douglas production function is attractive due to its simplicity and logarithmic nature of the production function [11]. A logarithmic transformation makes a model linear in the logs of inputs. Furthermore, Translog production function is more complicated to estimate the parameters, as the number of variable inputs increases, the number of parameters to be estimated increases. Also, Translog functional form has a serious multicollinearity problem [12]. Accordingly to the review, stochastic frontier model with Cobb-douglas function was most widely appropriate.

Moreover, according to previous empirical study a number of factors explain the low productivity and variability of sesame in Ethiopia. These include lack of improved seed variety, post-harvest crop management and high disease and pest, existence of limited access to market, low price of product, lack of storage, presence of transport problem and low quality of product ([6, 30, 46, 1]). Furthermore, according to previous research, there were inefficiencies of smallholders' farmers in sesame production and overall crop such as barely, maize and wheat in Ethiopia ([4, 41, 27, 44, 38, 33, 31, 13]).

The main path to development of smallholder farming is through improved technologies, appropriate management practices. This implies that farmers are required to have the ability to make the right decisions about acquisition and utilization of resources in a way that maximizes output at minimal cost. In other words farmers will be efficient both technically and allocatively and hence economically efficient. The ability of farmers to make the appropriate decisions in farming activities is influenced by socio-economic characteristics and demographic factors that include: sex of household head, gender, education level, and family size, non-farm activities, access to extension services and credit.

3. Summary

Sesame is produced in different areas in Ethiopia. Ethiopia has favorable agro-climatic conditions for cultivation oilseeds. The diversified agro-ecology, Land suitability, Sesame market demand, high labor source, Water availability for irrigation in Ethiopia is suitable for sesame production. The Ethiopian's oilseed sector is the fastest growing sectors and Sesame being second largest exports revenue generating after coffee. The oilseeds produced are supplied to the domestic and international markets. In addition to foreign exchange earnings, it uses as source of income for millions of population. Sesame seed is the most significant contributor to Ethiopia's national economy.

The total cultivated area and total output produced were increased while the total productivity was decreased year to year. The productivity of sesame varieties is very low when compared with other crops. The current productivity levels of sesame in Ethiopia far below the average. Sesame production and marketing in Ethiopia have been facing various challenges that need to be addressed such as; lack of improved seed variety, post-harvest crop management, high disease and pest, existence of limited access to market, low price of product, lack of storage, lack of transport and low quality of product, traditional production technology, market fluctuation, low research and expert knowledge and skills, and climate change impact.

According to the review result there was substantial amount of inefficiency in sesame production in Ethiopia. Soil fertility, non-farm income, credit access, Education level, experience in sesame production, extension contact, Labor and seed significantly affected production efficiency.

4. Conclusion and Recommendation

There is a considerable room to enhance the level of technical, allocative and economic efficiency of smallholder farmers in the study area. The study result suggested that interventions aiming to improve efficiency of farmers in the study area could need.

Also, less efficient farmers are advised to share an experience from the most efficient farmers to increase their efficiency level.

The study recommends proper extension services with

equipped skills may assist farmers to be better decision makers of their farms that ultimately increase the level of efficiency.

Government and other stakeholders could have designed appropriate policy to provide adequate and effective basic educational opportunities to the rural population.

Furthermore, the establishment of sufficient rural finance institutions and strengthening of the available micro-finance institutions could need to assist farmers in terms of financial support.

The study result suggested that government could increase the efficiency of smallholder farmers via the development of road and market infrastructure that reduce distance of farmer's home from nearest to plot and from nearest to market.

Also, farmers could have to get inputs easily and a communication channel has to be improved to get better level of allocative efficiency.

Concerned stakeholders and government organizations are advised to identify the different possible types of non-farm activities and support with the necessary knowledge and skills of the various types of non-farm activities that could improve their efficiency statutes of smallholder farmers.

Moreover, they could need to design appropriate policy and strategies for improving livestock production systems which in turn would enhance the efficiency of smallholder farmers. Such as sustainable intensification of the production system, market oriented production system and regulation of industrial systems and livestock product demand.

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