CHICKPEA PRODUCTION IN SHWEHLAY VILLAGE, PWINTPHYU TOWNSHIP

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Abstract

The study of this paper is to investigate the Cobb-Douglas production function for chickpea production of ShweHlay village, Pwintphyu Township. This model is fitted for the relation between a dependent variable such as chickpea production and set of independent variables such as land, labor and fertilizer. Simple random sampling was used for primary data collection from 104 farmers growing chickpea. Descriptive statistics using percentage and frequency tables were used in the analysis of the socio-economic characteristics of the chickpea growers. According to the results, gender distribution can be found that the number of male chickpea grower is larger than that of female. Farmers growing chickpea has age group between 50 to 60 years is largest. The total population of the primary school level is 43.3%. and the largest number of farmers growing chickpea less than 10 acres. Based on the Cobb-Douglas production function, and the linear function. Whereas the coefficient of determination R^2 is 0.866 and F-statistics is 216.122. Findings from the study indicate that land and fertilizer were positively and significantly at 1% level while labor was positive and significant related to chickpea production in ShweHlay village. There exists constant to scale to return but its value would increase after efficient use of all inputs.

Keywords**:** Land**,** Labor, Fertilizer, Cobb-Douglas Production function

1. Introduction

Myanmar is an agricultural country that country's economy mainly depends on exporting agricultural products to other countries. Nowadays, the government is planning to improve the agricultural sector by laying down the economic policies. As the development of agricultural sectors, implementing the availability of sufficient edible crops for the increasing population plays an important role. Chickpea is commercially important and widely grown vegetable crops in the world.

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Chickpea is a highly nutritious and inexpensive source of protein that is estimated at 24% and ranges from 15% to 30% (Hulse, 1994) depending on variety and environmental conditions. There are numerous uses for Desi and Kabuli types and can be boiled, eaten raw as a fresh vegetable, roasted, dehulled to make dal or, processed into flour that can be added to bread.

Chickpea is grown all over the world in about fifty-seven countries under varied environmental conditions. India is the single largest producer of chickpea in the world, 65% of the total production under chickpea. Production is low in other developing countries. The yield rates are above 2 tons/ha in Yemen and Russia.

In Myanmar, there are over 62 crops recognized by the government. The Settlement and Land Records department grouped those crops item into seven, namely cereals, oil seeds, Beans, spices and condiments, tobacco and betel beverages, fiber and miscellaneous. Beans are grown in all states and division in Myanmar. Out of those varieties of beans, the present selected crops become major marketable crops in the country as well as international market. Now production of beans is dramatically increasing due to the high market demand for domestic consumption and export. Formal trade exists with India, Malaysia, Singapore, Pakistan and European Union (EU) countries.

Beans are the second most important crop, and have a high export potential. In Myanmar, black gram, mung bean, pigeon pea, chickpea, cow pea, red kidney bean, velvet bean, and soybean are mostly grown. Chickpea is the second largest pulse crop grown in Myanmar after dry beans (FAOSTAT 2018). Chickpea are traditionally grown in many parts of the world. As well as being an important source of human food and animal feed, it also helps in the management of soil fertility, particularly in drylands A systematic tracking approach was developed using a representative sample survey conducted in Central Dryland Zone of Myanmar where nearly 96% of total chickpea is being cultivated. The cropped area is concentrated more in Sagaing (46%), Mandalay (26%) and Magway (23%) region.

Chickpea is economically attractive and the area under cultivation is increasing. Chickpea have been traditionally grown in Magway since ancient time. As growers earn high income, it should be widely grown. So, it is also grown in almost every region of Myanmar because it is an economical and profitable crop to grow.

In this paper, the condition of chickpea plantation ShweHlay village, Pwintphyu township, Magway region which the largest cultivated region of chickpea is analysis with statistical methods in this study. The population of ShweHlay village do agriculture as a major

business through the village. Therefore, the village can increase income by selling crop chickpea in wholesale center in other townships.

1.1 Objective of the Study

The main objective of the study is;

1. to study the effect of input on chickpea production of ShweHlay village
2. to determine the types of return to scale of chickpea production

1.2 Methods of Study

The study involved 104 farmers growing chickpea households in Shwehlay Village. A face to face questionnaire was used in May 2022. Data are collected by using simple random sampling method with questionnaire interview. In this paper, descriptive statistics is applied for the analysis of data using simple statistical tools like average and percentages. The Cobb-Douglas production function is applied to analyse the chickpea production of ShweHlay Village, Pwintphyu Township, Magway Region.

1.3 Scope and limitation of the Study

In this study, the analysis is based on primary data and it was collected from the ShweHlay village. There are 285 households in ShweHlay village. Among them, 205 farmers growing chickpea. Among various production function, Cobb-Douglas production function is used in this study. Additional information is obtained from published by the Settlement and Land Records Departments.

2. Literature Review

Salami and Ahmadi (2010) analyzed “Energy Inputs and Outputs in a Chickpea Production System in Kurdistan, Iran”. The aims of this study were to determine the amount of input–output energy used in chickpea production, to investigate the efficiency of energy consumption, to make an economic analysis of chickpea production, and to establish a relation between energy inputs and yield. Data were collected through a survey using a face-to-face questionnaire. The research used Cobb-Douglas production function and linear function. The Cobb–Douglas function, and the linear function, were selected to establish the best fitness relations between the production and various energy inputs. Whereas the R squares in both models are close, but it has shown that the Cobb–Douglas function was better than linear

function. In this study, chickpea production in Kurdistan, Iran and the energy equivalences of input used in production were investigated.

Thakur, et al. (2016) "Resource use efficiency of chickpea production in the Sagar district of Madhya Pradesh. The objective of the paper is to estimate resource use efficiency of important inputs in chickpea production and to identify the constraints associates with production of chickpea. This research used multiple linear regression model and Cobb-Douglas function. The results observed from analysis of data that an average grower found to use of the resources in efficiently production of chickpea, plant protection measure.

Bassa (2018) explored Chickpea Production Among Smallholder Farmers in Damot Gale and Humbo Woredas of Southern Ethiopia. The aim of the study is the chickpea production among smallholder farmers in Damot Gale and Humbo Woredas and to identify the production function of chickpea crops Cobb-Douglas production function was employed. Primary data were collected from sample households using structured questionnaire. Descriptive statistics and econometric model were employed to analyze the data. By using simple random sampling techniques four sample Kebeles households were selected. Descriptive statistics and econometric model were employed to analyze the data. The findings were consistent with the economic theory; the coefficients of chickpea seed were significant showing that it was the most important factors affecting chickpea production in Damot Gale and Humbo Woredas. Moreover, the fertilizer use of chickpea production in kilogram was also significant in the study areas.

Merga, et al. (2019) studied Economic importance of chickpea: Production, value, and world trade. The objective of this paper is to examine the global and regional trends in area under cultivation, production, yield, trade, price, and consumption of chickpea. This study examines chickpea production, value, and trade on a global, regional, and country basis to determine trends in production and product availability through domestic and international export markets. World, regional, and country production, and demand data are reviewed to determine trends and future expectations for the chickpea crop and its importance in world trade. The study used descriptive analysis method. This paper found that the trend analysis reveals the growing importance of chickpea crop across all economies and the lack of research efforts in the world. In the developed economies, the commercial benefits from expanding chickpea production are being realized more than ever in the past few decades.

Kosgei et al. (2021) studied Farmers' Perception on Production Constraints, Trait Preference and Variety Selection of Chickpea (Cicer arietinum L.) in Kenya. This study investigated farmers' production constraints, preferred traits, and selection criteria for specific

varieties to generate information that can assist in the development of new varieties, which can be more readily adopted by farmers. The direct ranking was used to identify farmers' constraints to chickpea production, preferred traits, and specific chickpea varieties based on preference. Farmers in both counties also had a higher preference for Desi than Kabuli chickpea types because of tolerance to drought and disease resistance and that its testa does not peel off when cooked. This study revealed farmer-preferred traits in varieties they would want to grow. Breeders should aim at developing varieties with multiple traits for increased chickpea adoption and production in Kenya.

3. Background of Pwintphyu

The population of Magway Region is 4.09 million in 2020. Magway Region's districts are Magway, Minbu, Thayet, Pakokku and Gangaw comparising 25 townships and 1696 ward village tracts. Its capital city is Magway (2020 urban population estimated as 85214 and its largest city is Pakokku (2020 urban population estimated as 107890). Other major cities are Aunglan (population estimated as 52431), Yenangyaung (Population estimated as 49938), Thaungdwingyi(Population estimated as 47739), Chauk(Population estimated as 47568) and Minbu (Population estimated as 40304).

Pwintphyu Township is a township of Minbu District in the Magway Division of Myanmar. Pwintphyu Township is 20 d 21' 48 " N between 94 d 40' 10' E. Pwintphyu Township has total population 163692. There are males 76,740 and females 86952. The majority of the people in the Township live in rural areas with only (3.9%) living Urban areas. In Pwintphyu Township, 43.5% of the employed persons aged 15-64 are skilled agricultural, forestry and fishery work and is the highest proportion followed by 32.2% in elementary occupations.

There are six villages in the ShweHlay group. This villages are ShweHlay Village, YwaHtaung Village, PokeSu Village, ChonSu Village, Ghat Kone Village, HmaYoeKone Village and PoePaukSu Village. There are a total of 336 houses in ShweHlay. There are 285 households, total population have over 1230. It is existed in Pwintphyu Township, Magway Region. Efforts have been made since 2012 to provide electricity to ShweHlay Village received electricity on 8 December 2014. Gravel Road was paved form ShweHlay to LeKaing Town from 2015 to today. Pwintphyu Township, ShweHlay Tract, ShweHlay village has about 390 acres of Land. In ShweHlay Village, 80% are farmers and 20% are farm workers.

The principal product of Magway Region is petroleum. Magway Region produces most of the oil and natural gas in Burma. Magway Region's oil fields are located in Mann, Yenangyaung, Chauk, Kyauk-khwet, Letpando and Ayadaw. Magway Region is the largest

Agricultural sector, the major crops being sesamum and groundant. Other crops grown are rice, chickpea, millet, maize, sunflower, beans and pulses, tabacco, toddy, chilli, onions and potatoes. Magway Region of Famous products is Thanaka.

Pwintphyu Township is the most agricultural town about 66,664 acres of edible oils crops and kitcher crops in 2021-2022 financial year during the winter planting season, according to the official statistics of the Pwintphyu Township Agriculture Department. Pwintphyu Township has one of the most irrigation water areas of 25 townships of the Magway Region.

4. Cobb-Douglas Production Function

The most popular and widely accepted approach to examine the resource use efficiency in agricultural production is the production function approach. A number of functional forms of production function is available in efficiency studies. Among them, the Cobb-Douglas production function is the most widely used functional form. The functional form was chosen because of its simplicity, and computational feasibility and the ease of estimation and interpretation Production function in mathematical form helps to make such analysis. The production function is commonly used for analysis of which Cobb-Douglas production function.

The Cobb-Douglas production function is particularly attractive to the economists, because it easily explains the economic activity and at the same time it is easy to be analyzed. The Cobb-Douglas production function was applied not only to the production process of individual firm, but also to the whole of the manufacturing industry. The Cobb-Douglas production function was developed by two American economists, Charles W.Cobb and Paul H. Douglas. The Cobb-Douglas Production Function take the general form

$$Y_i = \beta_1 {X_{2i}}^{\beta_2} {X_{3i}}^{\beta_3} e^{u_i}$$

Where;

Y_i = Output

X_{2i}= Labor Input

X_{3i}= Capital Input

β_2 and β_3= coefficients

β_1= Technical Efficiency

μ_i= Stochastic distribution term

In the equation 'β_2' represents the elasticity of output with respect to labor, i.e, the percentage increase in Y_i for 1% increase in X_2 while holding X_3 constant. Thus 'β_2 ' show

the output elasticity of Labor and relative share of labor in the output. On the other hand, "β_3 ''represents the elasticity of output with respect to capital, i.e, increase in Y_i for a 1% increase in the quantity of capital while keeping labor constant. Thus 'β' the output elasticity of capital or relative share of capital in the output.

Using the Cobb-Douglas production function it can be derived the Laws of Returns to Scale. In the above example $\beta_2 + \beta_3$=1. This represents a constant return to scale. That means 1% increase in both the capital and labor will bring about 1% increase in output. This is also known as homogeneous of degree 1. On the other hand, if $\beta_2 + \beta_3$> 1, then there is increasing returns to scale. That means 1% increase in capital and labor will bring about more than 1% increase in output. If the value of $\beta_2 + \beta_3$ <1, then there is decreasing returns to scale. This shows that 1% rise in the factors would bring about less than 1% increase in output.

$\beta_2 + \beta_3$ <1, Decreasing returns to scale

$\beta_2 + \beta_3$ = 1, Constant returns to scale

$\beta_2 + \beta_3$ > 1, Increasing returns to scale

Assuming perfect competition, can be shown to be labor and capital's share of output. Constant return to scale implies that the production function is homogeneous of degree 1: scaling the inputs of production by a constant lead to the same proportional change in output.

5. Sample Summary Statistics of 104 farmers growing chickpea

In this section, the demographic conditions of chickpea growers in rural of ShweHlay village are analyzed by descriptive statistics . The table (1) expresses the demographic situations of chickpea growers in ShweHlay village.

Table 1. Summary Statistics of Farmers Growing Chickpea

Variable	Category	Frequency	Percent (%)
Gender	Male	50	48.1
	Female	54	51.9
Household Age	30-40	17	16.3
	40-50	19	18.3
	50-60	29	27.9
	60-70	27	26.0
	70-85	12	11.5
Education Level	Monastic	14	13.5
	Primary school	45	43.3
	Middle school	27	26.0
	High school	6	5.8
	Graduate	12	11.5

Variable	Category	Frequency	Percent (%)
Number of Student	No student	64	61.5
	1	25	24
	2	15	14.5
Household size	1- 3	36	34.6
	3-5	56	53.8
	5-7	12	11.6
Number of Labors	1- 3	94	90.4
	3-5	7	6.7
	5-7	3	2.9
Family Labors	1-3	15	14.4
	4-6	13	12.5
	7-9	21	20.2
	10-12	10	9.6
	13-15	45	43.3
Hire Labors	1-3	9	8.7
	4-6	20	19.2
	7-9	42	40.4
	10-12	15	14.4
	13-15	18	17.3

Source: Survey Data (May, 2022)

According to the results in Table (1), household leaders are male, accounting for 48.1%, and the remaining 51.9% are female.

The age group between 50 to 60 years is largest with 27.9% and the age group between 70 to 85 years is smallest with 11.5%. The proportion of working age among the total population, i.e. between 30 to 60 years is 62.5%. Therefore, in this township, the number of persons in the working age group was greater than that of dependents. In this township, the labors was high in number.

According to above table, the total population of completed primary schools was 45, 43.3%. Middle school level students of farmers growing chickpea were 27, 26%. High school of farmers growing chickpea were 6, 5.8%. And then University level of farmers growing chickpea were 12, 11.5%.

According to the household of farmers growing chickpea in ShweHlay, the largest number of households is no student, and its percentage is 61.5%, there is one student in 25 households, and its percentage is 24%.

The size of family numbers 3 to 5 is 56 households head and its percentage is 53.8%. The second largest size of family numbers 1 to 3 is 36 households and its percentage is 34.6%.

According to the findings table 1, it is found that the most of the working number are between 1 and 3 people and it constitutes 90.4% and the second of the working number are between 3 and 5 people and it constitutes 7.6% of total family size. The lowest working number in family member are 5 between 7 people and it constitutes 2.9%.

It is found that the most the number of chickpea growers of owner worker are 13-15 and it constitutes 43.3% and the second of the number of chickpea growers of owner worker are between 7-9 and it constitutes 20.2%. The third of the chickpea growers of worker are between 1-3 and it constitutes 14.4%.

According to above table show that the most the number of chickpeas growers of Hire worker are 7-9 and it constitutes 40.4% and the second of the number of chickpeas growers of Hire worker are between 4-6 and it constitutes 19.2%. The third of the chickpea growers of Hire worker are between 13-15 and it constitutes 17.3%

5.1 Input Factors for Chickpea Production

In the analysis, the required data for this study were obtained from the survey of ShweHlay Village. To collect the data from sample survey from the farmers growing chickpea households, face to face personal interviews were utilized. The following summarize data is shown in the following table.

Table 2. The Situation of Chickpea Production

Production (bushel)	**Frequency**	**Percent (%)**
<60	55	52.9
60-100	21	20.2
100-140	8	7.7
140-200	10	9.6
200-240	3	2.9
240-280	1	0.9
>280	6	5.8
Mean	30.123810	
Standard deviation	28.542376	

Source: Survey Data (May, 2022)

In Table 2 which shows the analysis of the situation of chickpea production, it is found that 52.9% of the farmer growing chickpea produce below 60 bushels, 20.2% of the chickpea producers produce between 60 and 100 bushels, 7.7% of the chickpea producers produce between 100 and 140 bushels, 9.6 %. of the chickpea producers produce between 140 and 200 bushels, 2.9% of the chickpea producers produce between 200 and 240 bushels, 0.9% of the

chickpea producers produce between 240 and 280 bushels, 5.8 % of the chickpea producers produce greater than 280 bushels. Based on the production amount of chickpea, the output of chickpea (in bushels) of the i^{th} grower in the sample aggregate output of the chickpea yields in the year 205 by the growers. the chickpea growers are divided into seven groups. Its mean is 30.1238 and the standard deviation is 28.542376. The largest number of chickpea growers produce less than 60 bushels of chickpea.

Table 3. The Situation of Land Acquisition

Land (Acres)	**Frequency**	**Percent (%)**
Less than 10	80	77.1
11-15	21	20.0
More than 16	3	2.9
Mean	4.63	
Standard deviation	9.87	

Source: Survey Data (May, 2022)

In table 3 describes that the chickpea growers are divided into three groups based on the acreage of their own land. These groups are less than ten acres group, between 11 and 15 groups and more than 16 acres group. It is found that the largest number of chickpea growers is less than ten acres group. Its mean value is 4.63 and the standard deviation is 9.87.

Table 4 The Situation of Labor Cost (Kyats)

Labor Cost (′000 Kyats)	**Frequency**	**Percent (%)**
< 80	41	39.4
80-120	9	8.7
120-160	15	14.4
160-200	9	8.7
> 200	30	28.8
Mean	409952.380952	
Standard deviation	2525895.305404	

Source: Survey Data (May, 2022)

In table 4 describes that the situation of labor cost, the farmers growing chickpea are divided into five groups: under 80, between 80 and 120, between 120 and 160, between 160 and 200 and over 200. It is found that the largest number of farmers growing chickpea is found in between less than 80 groups and it represent 39.4%. It is found that the second largest number

of chickpea growers is found over 200 groups and it represent 28.8% Its mean value is 409952 and its standard deviation is 2525895.

Table 5 The Situation of Fertilizer Use

Fertilizer Use (′000 Kyats)	**Frequency**	**Percent (%)**
10-30	18	17.3
30-60	35	33.7
60-90	8	7.7
90-120	15	14.4
120-900	28	26.9
Mean	95476.19	
Standard deviation	114290.293	

Source: Survey Data (May, 2022)

In table describes that the situation of fertilizer use, the chickpea growers are divided into five groups: between 10 and 30, between 30 and 60, between 60 and 90, between 90 and 120, between 120 and 900. It is found that the largest number of farmers growing chickpea is found in between 30 and 60 groups and it represents 33.7%. Its mean value is 95476.19 and standard deviation is 114290.293.

Table 6 Income and Expenses of Farmers Growing Chickpea

Variable	**Category**	**Frequency**	**Percent (%)**
Income (′000 Kyats)	≤100	10	9.6
	100-200	61	58.7
	200-300	25	24.0
	300-400	6	5.8
	400-500	2	1.9
Expenses (′000 Kyats)	≤100	9	8.7
	100-200	8	7.7
	200-300	46	44.2
	300-400	25	24.0
	400-500	11	10.6
	500-700	5	4.8
Total		**104**	**100.0**

Source: Survey Data (May, 2022)

As the results, it is found that 9.6% of family income per month under 100, 58.7% of family income per month between 100 kyats and 200 kyats per month, 24.0 % of their

expenditure between 200 kyats and 300 kyats per month and 5.8% of sample size expenditure between 300 kyats and 400 kyats per month.

As the results, it is found 8.7% of family expenditure per month under 100, 7.7% of family expenditure per month between 100 kyats and 200 kyats per month, 44.2 % of them expenditure between 200 kyats and 300 kyats per month and 23.8% of sample size expenditure between 300 kyats and 400 kyats per month,10.5% of family expenditure per month between 400 kyats and 500 kyats per month, 4.8 % of the expenditure between 500 kyats and 700 kyats per month.

5.2 Cobb-Douglas Production Function for Chickpea Production

Cobb-Douglas production function was used to estimate economic efficiency of farmers in pwintphyu township from cross-sectional data. This functional form was chosen because of its simplicity, computational feasibility and the ease of estimation and interpretation. The coefficients are themselves the elasticities and the marginal resource productivities at the mean level of inputs can also be obtained. The research used Cobb-Douglas production function and linear function. The Cobb–Douglas function, and the linear function, were selected to establish the best fitness relations between the production and various energy inputs. The Cobb- Douglas production function model is demonstrated on the basis of primary data which is collected ShweHlay Village. Sample of 104 farmers growing chickpea are used in this study. The model is constructed by using three independent variables such as land, labor and fertilizer. Chickpea production is used as dependent variable. To fit the model, land labor and fertilizer are used as independent variables.

In constructing the model, the variables are noted as

PRCP = Chickpea production of bushels

LAND = Land of acres

LAB =Number of labor, including hired and own labor

FER = Fertilizer

Multiple regression model takes the following form

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \mu_i$$

The log-transform this model is

$$\ln Y_i = \ln \beta_1 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \mu_i$$

$$= \beta_0 + \ln \beta_1 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \mu_i$$

Where, $\beta_0 = \ln \beta_1$

The Cobb-Douglas production function is given as;

$$\ln PRCP = \beta_1 + \beta_1 \ln LAND + \beta_3 \ln LAB + \beta_4 \ln FER + \mu$$

Where, μ is disturbance term and unknow parameters β_1, β_2, β_3, and $\beta_4$in Cobb-Douglas production function is estimated by using the Statistical analysis. The calculated results are described in the Cobb-Douglas production function of chickpea production in the following.

Table 7 Result for Cobb-Dougals Production Function of **Chickpea Production**

	B	**t**	**Sig.**
(Constant)	-5.408	-1.049	0.297
Ln LAND***	19.440***	9.655	0.000
Ln LAB***	.070***	3.704	0.000
Ln FER	2.708	.100	0.921
F - ratio	216.122***		0.000
R	0.931		
R^2	0.866		
Adjusted R^2	0.862		

Source: Survey Data (May, 2022)

Note: * = Significant at 10% level, ** = Significant at 5% level, *** = Significant at 1% level

The result of Cobb-Douglas production function of chickpea production was shown in table. The p value is determined by the F-statistics and it can be concluded that the overall regression is significant at 1% significance level. The value of coefficient of determination R^2 was 0.866. It shows that the proposed model explained 86.6%variations in the log of chickpea production as a result of variations in the logs of land, labor and fertilizer. The regression equation for chickpea production is

$$\ln Y_i = -5.408 + 19.440 \ln LAND + 0.070 \ln LAB + 2.708 \ln FER$$

The values of the coefficients indicate the elasticity of various inputs to the outputs. The coefficient of land and labor are significant at 1% level, respectively. The coefficient of labor was positive and significant. Chickpea production elasticities of land, labor and fertilizer were 19.440, 0.070 and 2.708 respectively. The results shows that a one percent increase in land is associated with a 19.440 percent increase in chickpea production holding labor and fertilizer constant. Each additional labor is associated with a 0.070 percent increase in chickpea production holding land and fertilizer. And then, fertilizer is associated with a 2.708 percent increase in chickpea production holding land and labor constant.

Use of Land mostly dependents on condition of crop. Return to scale was estimated by summing production of land, labor in chickpea production. The value of return to scale was

which 19.51which implies the presence of constant return to scale. It means that increase in chickpea output is equal to the increase in input by 1%.

6. Conclusion

To analysis, chickpea production, a sample of 104 farmers growing chickpea are interviewed by questioning of ShweHlay village in Pwintphyu township, Magway Region. The family members of chickpea growers are found between 3 and 5 members. The optimum family numbers and daily worker are highest in this area. The head of plantation of most of the chickpea grower is Female 51.9% and 48.1% is male. Most of the chickpea grower are also found that age is between 50 and 60 years. The proportion of working age is larger than that of dependents in study area. The chickpea growers are mostly primary school level. It is found that the University level is low. The largest number of chickpea growers produce under 60 bushels. As a result, it can be concluded that the number of labor force in the studied area is high. The optimum family numbers and daily worker are highest in this area. The largest number of chickpea growers is found in less than ten acres group and labor cost is less than 80000 kyats. The fertilizer cost of chickpea growers between 30000 kyats and 60000 kyats is the highest.

Coefficient of determination $R^2$and F- statistics were 0.886 and 216.122, respectively which indicate the overall goodness of Cobb-Douglas model. Land and fertilizer were observed to affect chickpea output significantly. The elasticity value indicates that if land under cultivation is increased by 1%, yield of chickpea would increase by 19.14%. Return to scale was estimated by summing production such as land and labor in chickpea production. There exists constant return to scale but its value would increase after efficient use of all inputs, so, increase in chickpea output is equal to the increase in input by 1%.

The Cobb-Douglas production function model for chickpea production has the error term is normal distributed. And then, the residual in chickpea production has an equal variance or homoscedasticity. Finally, there is no multicollinearity problem in this study of chickpea production. The Cobb-Douglas production function model for chickpea production of ShweHlay village in Pwintphyu township, Magway Region is satisfied.

6.1 Suggestions

The government should support the chickpea growers in ShweHlay village in Pwintphyu Township in testing soil to differentiate the types of land. Modern technology should be taking on for superior labor cost control. The policy makers and researcher's considerations of climate change effect on chickpea production. Effort should be made by the concern services, agencies to create more awareness about improved variety and adoption of plant protection measures in

chickpea in the study area. Timely proper guidance to the chickpea growers from the concern person is needed as chickpea is perishable crop.

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