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PERFORMANCE AND DETERMINANTS OF TEFF PRODUCTION IN OROMIA REGION : A CASE OF CHALIA WOREDA

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Abstract

This final thesis paper investigates the main determinants of teff production in Chalia woreda by using cross sectional data. Hence the main determinants of teff production includes farm size, modern inputs, select seeds, livestock, family size and education not head house hold which have the great positive contribution of the output of teff. In fact these determinants are analyzed by using both descriptive and more extensively: by linear econometrics model. The out put /quantity of teff is taken as dependent variable and determinants are as independent variable. As result shows all variables are significant and tiffed the hypothesis.

1. INTRUDUCTION

1.1 Background of the Study

Agriculture was started many thousands of years ago. Through the emergence of agriculture was not properly known. It was the oldest of human being lively hood. Agriculture had old history in ancient world civilization like China, Egypt and other parts of the world.

Ethiopia with actual land area of around 11.3000.00 hectares was one of the largest countries in Africa. The country was endowed with the presence of rich about 60% is estimated to be arable land.

However, much of its potential had not yet been exploited there were many activities that advise to agricultural: these where crop production, live stock, forestry, fishing and pastoralism.

Agricultural is the main stay of Ethiopian Economy. This sector was dominated by small farmers who had been adopting. How inputs and outputs on mixed farming with the technological change.

Agriculture is the foundation of the country food production that contributes to food security. It accounts for about 50% gross domestic products (GDP) or (GNP) provided great employment opportunity, for about 85% of the population supplied about 90% export earning and generates about 70% of the raw materials for domestic medium and large scale industries(MOFE, 1994)

Agriculture is also the world's larges industry it employees more than one billion people and generates over 1.3 trillion dollars worth of food annually (world wild life organization industry) was stainable.

"the main burden of development and employment creation will have to borne by the parts of the economy which agriculture was the predominant activity that is the rural sector parts of the expansion can be found in the economy" (Todaro 2002)

The agricultural, development had industrialization (ADLI) which had been adopted as a development since 1994/95 was strongly believed to have put agriculture sector in its proper place in the Ethiopian economy.

Available evidences indicated that the yield levels of major cereals have not improved that against the expectation of drastically higher level of productivity as predicted based on demonstration results. National productivity as predicated based on demonstration results. National productivity increase production: for example, remains stagnant in the Oromia region of 11.4 quintal per hectare for the last three decades or some ever these recent improvements in total crop production has also failed to change the negative trend in per capital. (EEA Annual Report, 2002)

In this study, Teff production is one of agricultural activity it was only produced by Ethiopia and Eretria in the world are under Teff cultivation expanded from 2.14 million /www. FAO. Orgn) file amd (template/maf…)

Teff is also grown over approximately 2.8 billion hectares or 27% of the land area under cereal production (www.ate.gov.et/teef) it is also the preferred staple cereal for most of the population, however these encouraging performance must be interrupted in the context of high population growth and poor condition in base year per capital production was very low still (EEA/ EJOE, 2007).

In the same condition, the problem was aggravating in the specific study area which was Chalia Woreda in Oromia region of Ethiopia.

Ethiopian economy is highly on agriculture which contributed 80% of labor force employment 46.6 % of GDP, 60% of total export and supply of raw materials to the country agro-industrial sector and the main principal source of food production (FAO, 2006).

Besides all these potential for food millions of people in the people in the country area chronically food insecure or under poverty line, Even in a good harvest year party yelay on food aid (IBID)

The people in the country to meet their minimum food requirement, the challenge with slight variation on climate and accessibility to market of products.

The sector highly depends on rainfall with minimum of arable irrigation. In addition law fertilizer use susceptibility to pest disease out breaks and extensible high soil erosion has meant to high variability in a year to year agricultural production which predominantly in the peasant holding (FAO, 2004).

Woreda's experience that farmer's attitudes and tendency to adopt and accept new innovations, modern agricultural techniques such as use of fertilizers, irrigation, improved seeds and

pesticides that held to improve their living standards, through attaining enhanced productivity do have positive impact on the development of agriculture sectors as a whole. However, the above is good experience for economic development, there is limited use of improved seeds, fertilizers, new improved technologies and irrigation in woreda: Not only these but, also limited hours of work and high price of in puts interims of product price is one of the most preferable and stable food and can be produced easily. These study area would investigated the performance and determinants of teff out put in the study area.

Objective

The specific objectives of the study are

- To evaluate the performance of teff productivity
- To examine the determinants of teff productivity
- To examine teff productivity trend in the study area.

1.4 Significance of the Study

Like any other developing nations of the world, one of the goals of the government of Ethiopia is, to raise agricultural production and productivity, by providing possible assistance, to assert the economic sustainability of rural small-scale peasants and to avoid or at least reduce the rampant poverty (MOA, 2005). Hence, this paper could be significant because it attempts to analyze the determinants of teff production. In addition, it could also enable to have some guide lines on what type of inputs should the government give emphasis to provide for farmers.

The findings, conclusions, and recommendations will help policy makers to easily identify the determinants of teff production. In addition, it may be used as a source of information for those researchers who want to conduct a deeper study in the area.

2. LITERATURE REVIEW

The major stable crop, change in the production and yield of teff is an important variable when one wants to evaluate the importance of productivity of food production in the country. For that very reason, the government's program to increase productivity is concentrated on those products along with wheat and maize. Accordingly, what happened in the performance of these crops is a good indicator of status of the extension program with in the time frame considered.

Teff production in Ethiopia increased substantially in 1996/97 reaching its highest historical level of about 20.4 million quintals the 1996/97 data, teff production was never reached again in the following three years. Compared to the 1999/00 it decrease by 34.8%, 19.4% and 15.7% respectively. On the other hand, compared to average of the dergue era the three years average was higher by 33.6% than average (EEA 2001).

(EEA/ EERI, 2006) during the dergue regime more emphasis and support was given to big commercial state farms and cooperatives farms. Which consumed about 95% of total area under crops and for more than 90% total agriculture out put teff importance was neglected (Ibld).

As far as post dergue regime the federal regional governments have taken structural adjustments, taken a structural adjustment to improve the productivity of each crops including teff per hectares.

However, the performance of cereal product could not be improved (Mulat, 2001). Annually teff production averaged 19.5% of total cereals produced 2000/02. While it shares in 1999/2000 crop years was 23.3%.

In the draught year of 2002/03 and in the subsequent bumper harvest year or 2003/04 teff allocated for 23.66 and 29% of production respectively. About 17.4 and 16.3 million quintals of teff were in 2001 and 2007 respectively (EEA, 2004).

3. RESEARCH METHODOLOGY

3.1 Description of the Study Area

Chalia is one of the woreda in west Shoa zone which was located 64 km far from Ambo town and 144km from Addis Ababa the woreda is bounded from East by Toke Kutaye woreda from North by Jimma and Meda Kegne woreda, form West by Ilugelan from south by Dire Hincinni and Jiba woreda.

The total area of woreda is covered about 49.557.5 hectares and arable land is about 25.778 hectares and gross land is around 2857 hectares. A mixed farming system in practice in this woreda mainly crop production which rain fed subsistence agricultural crop production.

The total population of urban and rural area of Chalia woreda where: males 8636 and females 7869, 48715 and females 49617 in urban and rural area respectively. Totally the population of Chalia woreda is 114,836 is living in the 24 of kebele's of the woreda. The climate condition of Chalia woreda is from 1500-3051 meters. The temperature of Chalia Woreda is 10°c-25^{0}c and annual rainfall ranges from 900ml-1400ml (CSA)

3.2 Data type and sources

The data has been collected from primary and secondary sources. Primary data was collected from Chalia Woreda local farmers and extension workers by using direct interviewing the study also used secondary data from Chalia woreda BOARD by using written documents and journals.

3.3 Sampling Techniques

This study focused on the sampling techniques of probability sampling methods. From the sampling methods simple random sampling techniques and stratified sampling techniques because of to take simple random sampling to reduce bias and it make our task easy. The stratum also has been used because of the woreda has almost the same environmental and method of production characters in the target three Kebeles.

3.4 Sampling Design

According to Yamane /1967/ sample size at 95% confidence interval the degree of variability 0.5 and level of precession 9percent sample size was computed as follows:

$n = N/1+N(e^2)$ N- the target population

e- Level of precession which is equal to 9percent

Thus, $n = 8354/1+8354(0.09)^2$

$= 123$

Even though the sampling result shows that the total number of sample size is 123, we have used 60 number of farm household because of budget and time constraint.

The stratum also seems like as follows:

Ni= $(\frac{n_i}{N}/)\ N_s$ where:

Ni= Total numbers of observation in the i^{th}Kebele

n= total number of farm households in the ith kebele

N= total number of in the 3 kebeles

Ns= total numbers of sample size that was used

Therefore, by using this stratified sampling formula the proportional numbers of respondents in each kebeles as follows.

From sokondo keble = (3009/8354) x 60 ≈ 22

From Racho Kebele = (1546/8354) x 60 ≈ 11

From Woliye Kebele= (3799/8354) x 60 ≈ 27

Table 3.1 Sample size allotted for each kebele

No.	Name of kebele	Target population	Sample size
1	Sokondo	3009	22
2	Racho	1546	11
3	Woliya	3799	27
	Total	8354	60

3.5 Methods of Data analysis

The data was analysis by using different methods like quantitative data analysis and qualitative data analysis. To employee such analysis both descriptive statistics and econometric model were intensively used for a given phenomena.

3.5.1 Model specification of teff production

The model shows the relationship between the productivity of teff and its factors. The researcher was used the ordinary least square methods: because the OLS method is better than other by BLUE. The model takes the quality of teff as dependent variable and its factors as independent variable (such as land, fertilizer, improved seed….) the empirical estimation of the model express as follows:

$$Q_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + U_i$$

Where Q_t= quantity (output) of teff which dependency on the following explanatory variables and others.

β_o= intercept which gives the mean value of teff out all variables are excludes from the model

β_1= measures the change in mean value of test product per unit change in teff from size (hectare) holding other variable are to be zero

β_2= measures the change in average value of teff output per unit change in family size

β_3= measures the change in mean value of teff per unit change of modern input other variables to zero.

β_4= measures the change in the mean value of teff (quintal) due to the per unit change of in use selected seeds not holding others to be constant.

β_5=measures the effect of change in the educational status of household head on teff production

β_6 = measures the effect of change in the total number of tropical livestock on teff production

U_i= error terms (disturbance term) which indicates by:

X1= land size in Hectare

X2= family size

X3= modern input in Kg

X4= selected seed in Kg

X5= educational status of household head (literate or illiterate)

X6= number of tropical livestock in the household .

3.6 Variables to be used

3.6.1 Dependent Variable

Quantify of teff: the total annual teff produced by farmers with one different in puts/ which is as explanatory variables/and other factors

3.6.2 Independent Variables:

Independent variables are these variables that determinant teff production in the study area. Those can be family size, land size, selected seeds, modern inputs, numbers of tropical livestock and educational status of household head.

4. RESULTS AND DISCUSSION

The survey result of the study is presented in two sections. The first section reports the relationship between different factors with teff production in descriptive statistics different factors with teff production in descriptive statistics from where as the second part reports the econometric analysis results of the study.

4.1 Descriptive Analyses

4.1.1 Characteristics of Surveyed Households.

A total of 60 farm households were interview for the study. From the, male and female farmers consisted 45 (75%) and 15(25%) respectively. See Table 4.1 in addition, the majority of the survey households were comprised of more than 380 members.

Table 4.1 Respondents by sex

Characteristics	**Frequency (%)**
Male	45(75%)
Female	15(25%)
Total	60(100%)

Source: own cross sectional data survey, 2013/14

A shown in table 4.2 55(92%) of respondents have been used farm lands for the production of teff. The remaining 5(8%) of respondents were not had farm lands. But, they were produced teff by sharing factors of production nice oxen, fertilizer, and selected seeds with the agreement of others farmers. In addition, it shows 57(95%), 48(80%) and 56(93%) fro the observed farmers used fertilizer, selected seeds and ownership of oxen respectively. (See table 4.2).

Table 4.2 Factors of production for Teff

Factors	**Sex**		**Total**
	Male	**Female**	
Use farm lands	41(68%)	14(23%)	55(92%)
Use fertilizer	49(82)	8(13%)	57(95%)
Use selected seeds	41(68%)	7(12%)	48(80%)
Ownership of oxen	48(80%)	8(13%)	56(93%)
Family size	50(83)	8(13%)	58(96%)
Total	**229**	**45**	**274**

Source: own cross sectional data survey, 2013/14

As shown in Table 4.3 respondents of 52(87%) or male 48(80%) and females 4(67%) where youth and 8(13%) or male 6(10%) and females 2(3%) respondents were old. (see table 4.3).

Table 4.3 Age Category of Respondents

Age Category	**Sex**		**Total**
	Male	**Female**	
Youth	48(80%)	4(67%)	52(87%)
Elder	6(105)	2(3%)	8(13%)
Total	54	6	60

Source: own cross sectional data survey, 2013/14

In addition, from table 4.4 shows 19(32%) or 17(28%) of males and 2(4%) females were literate and 52(87%) or males 35 (58%) and females 6(10%) of respondents were illiterate. (see table 4.4)

Table 4.4 Educational status of respondents

Educational Status	**Sex**		**Total**
	Male	**Female**	
illiterate	35(58%)	6(10%)	41(68%)
literate	17(28%)	2(4%)	19(32%)
Total	**52**	**8**	**60**

Source: own cross sectional data survey, 2013/14

More over the additional explanation is as expressed by the following Table 4.5 I indicates the level of raw data of teff factors of productions.

From Table 4.5 the researchers examined that the maximum level of output is 32 quintal of teff was produced in 2013/2014 by using the maximum level of modern input 6 kilogram, 10 numbers of labor and 6 numbers of oxen. Where as in conversely the minimum level of output of teff is 1quital this might be because of these farmers did not use like: fertilizers, selected seeds, oxen and family size.

The analysis of teff productivity performance also shows the following table 4.6. it explain the performance of teff productivity interims of output per hectares and output per labor.

Table 4.5 Levels of factors of teff productions

Variable	**Level**	
	Maximum	**Minimum**
Output of teff in quintal	32	1
Farm size in hectare	2	none
Modern input (in Kg)	6	none
No of oxen	6	none
labor	10	none
Selected seed(in kg)	50	none

Source: own cross sectional data survey, 2013/14

Table 4.6 indicates that the performance of productivity of teff in the study area in 2013/2014. As its clearly shown in the table the total amount of teff produced by the surveyed households is around 851quintals. To produce this much amount of teff the total land intensively used is 58 hectares.

The productivity of teff per hectare and labor employed was approximately 14.67 quintal/hectare and 3.02quintal per labor, respectively.

Table 4.6 Performance of teff productivity

R. No	**Productivity (In Quintal)**	**Total Farm Land (In Hect)**	**Total Employment**	**Productivity Per farm land**	**Productivity Per Lobar**
1	851	58	281	14.67	3.02

Source: Own cross sectional survey, 2013/14

4.2 Econometric Analysis

This section tries to analyses factors that determine teff production in Chalia woreda of Oromia region. The OLS regression analysis is employed for estimation purpose.

4.2.1 Econometric Tests

Before going to estimate the specified model, it is important to undertake different tests on whether the basic assumption of the model is meet or not.

4.2.1.1 Multicollinearity tests

Multicollinearity is an inevitable phenomenon in all multivariate analysis, no matter how small or big the problem however, if the correlation is strong it will affect the significance of the estimates and remedial is necessary. The non-existence of multicollinearity is tested using collinearity diagnostics (see Table 4.7). A rule of thumb is employed in characterizing the mulitcollinearity of the variable by the rule of thumb, if Variance inflating factor (VIF) is greater than 10, it is taken as series problem of multicollinearity. But, if VIF is less than 10, multicollineatiy is not serious problem. Consequently, the test result depicted in the Table 4.7 shows that there is no serious multicollinearity problem.

Table 4.7 collinearity diagnostics

Co linearity Diagnostic			**1/VIF**	**Tolerance**	**R-Squared**
Variables	**VIF**	**Square root of VIF**			
Land size	6.75	2.60	0.1481	0.1481	0.8519
Family size	3.75	1.94	0.2667	0.2663	0.7337
Selected seeds	3.45	1.86	0.2898	0.2897	0.7103
Modern inputs	1.16	1.08	0.8621	0.8603	0.1397
Educational status of household head	1.08	1.04	0.9259	0.9218	0.0782
Tropical Livestock	1.10	2.05	0.9091	0.9119	0.0881
Mean VIF	2.88				

Source: Own computation by stata 11, 2013/14

4.2.1.2 Goodness of fit tests

The goodness of fit of the model is measured by coefficient of determination R^2 which shows the percentage of total variation of dependent variable that can be explained by the independent variable. Since, the researchers used multiple regression analysis, thus adjusted R- square is preferable than R-square. It measures the net impact of independent variable on dependent variable. Thus, R- shows that 87 percent of the variations in dependent variable is due to

variations in explanatory variables like land size, family size, selected seeds, modern inputs, education status of household head and number of tropical livestock, keeping others remain constant (see Table 4.8).

Table 4.8 Estimated model results (points round into two)

Number of observation=60
F(6,53)=58.87
Prob>=0.0000
R-squared=0.87
Adj. R-squared=0.85

Source: own computation in 2013/14

4.2.1.3 Link test

If our model really is specified correctly, then if we were to regress quantity of teff on prediction and the prediction squared.

The prediction squared would have no explanatory power. This is what link test does: we find that since the P- value of hat square is insignificant. The prediction squared does have no explanatory power. So our specification is as good as we ought. Although, link test is formally a test of the specification of dependent variable, it is often interpreted as a test that conditional on the specification, the independent variables are specified correctly (See Table 4.9).

Table 4.9 results of link test

Quantity of Teff	**Coefficient**	**Standard Error**	**T**	**P>T**
Hat	0.77	0.26	3.01	0.00
Hat sq	0.1	0.01	0.91	0.37
Constant	1.48	1.80	0.82	0.42

Source: own computation by stata, 2013/14.

4.2.1.4 Heteroskedasticity test

In the classical linear model (CLM) assumption the disturbance term (Ui) are homoscedastic i.e the conditional up on the given value of explanatory variable remain the same regardless of the sample sizes. In other hand, the variance of the error term should be constant.

Otherwise, hetroscedasticity means there are different variance of the error term of the estimation model (Gujarat, 1998). It is more the problem of cross-sectional data, which results misspecification of the model and thus it leads to wrong conclusion. Therefore, the Breusch Pagan/cook-weisberg-test is used to detect heteroscedasticity problem.

Table 4.10 Breusch-Pagan/cook-wesiberg test for hetroscedasticity.

Breusch-Panan/Cook-Wesberg Test For Heteroscedasicity
Ho: constant variance
Variables: fitted values of Q teff
$Chi^2(1)=4.03$
Prob> $chi^2=0.0448$

In the above Table, since the p-value is higher (greater than one percent level of significance) we accept the null hypothesis.

Therefore, our data shows that the errors term has with constant variance. Since the study is cross sectional autocorrelation which is a common problem in time of serious data, is ruled out.

4.2.2 Estimation results and analysis

The parameters of OLS are estimated and the results are presented in the table below. The model was estimated using the cross sectional data which was collected from three Kebeles in the study area. The researcher was taken 60 samples by using 5% level of significance.

Table 4.11 Coefficient of Variable

Q Teff	**Coefficient**	**Standard Error**	**t**	**P>|t|**
Land size	5.04	1.97	2.56	0.013**
Family Size	0.92	0.30	3.03	0.004***
Selected seeds	0.22	0.05	4.17	0.000***
Modern input	1.02	1.54	0.66	0.513
Education status of household head	0.5	0.77	0.65	0.518
Live stock	-0.3	0.07	-0.47	0.641
Constant	-0.16	1.64	-0.10	0.921

Source: own computation by stat, 2013/14

***, ** significant at 1% and 5% level of significance respectively.

Estimation equation is specified as follows:

Q teff= -0.16 + 5.04 land size + 0.92 family size + 0.22 selected seeds + 1.01 modern input +					
	(1.64)	(1.97)**	(0.30)***	(0.05)***	(1.54)
0.5 education status of household head – 0.03 livestock + ui					
(0.77)			(0.07)		

***, ** significant at 1% and 5% level of significance respectively.

Where, Q teff- Quantity of teff production in quintal
NB- numbers in bracket are standard error of the coefficient have their hypothesis signs and impacts on production of teff.

As it is shown in Table 4.12 most of the estimated coefficients have their hypothesized signs and impacts on the production of teff.

Land size and teff production

The coefficient of land size is (+5.04) which shows a one hectare increase or decrease in teff farm size will increase or decrease the amount of teff production by 5.04 quintals on average, keeping other things remains constant. And the result is significant at 5 % level of significance. This might be due to as farm land size increases the nominal amount of production increases.

Family size and teff production

The family size and teff production are positively related, an increase in number of family size increases the amount of teff production by 0.92 quintals on average, keeping other things remains constant. The result is statistically significant at 1% level of significance. The result might be due to the probability of the existence of productive and active laborers widens as the number of family size increases.

Selected seeds and teff production

Selected seeds and teff production are positively and significantly related. Holding other variables constant, a one kilogram increase/ decrease in the amount of selected seeds, increases /decreases the production of teff by 0.22 quintals, which is statistically significant at 1percent level of significance. Thus more use of selected seeds in the production process increase the total output of teff.

On the other hand, modern input and educational status of household head are with expected sign, however statistically insignificant. In addition, the number tropical livestock in the household are with unexpected signs and statistically insignificant.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the above descriptive and econometric analysis result the researcher reaches the following conclusions.

- The study area Chalia woreda is one of the most prominent woreda which is engaged by subsistence agricultural teff crop production in Oromia region.
- The woreda is mainly dominated by male illiterate farmers. Whose usage of improved technologies is low.
- Farmers, who used improved seeds, large size of farm, fertilizer, and numbers of oxen and employment of labor had best performance of teff output than their counterparts.

5.2 Generally the experience of Chalia woreda teff producer farmers could not available enough products to the market as compared to the total coverage farm lands.

5.2 Recommendations

Based on the study results, the researcher gives the following some policy implication

- Since fertilizer does have positive impact on the yield capacity on teff output: farmers should be encouraged to use fertilizer.
- Governments have to allow larger labor techniques of production
- Chalia which collaboration of regional and federal governments shall be increase the supply of teff selected seeds at necessary season.
- Governments shall encourage farmers who used modern inputs like: fertilizer, selected seeds, participation of employment of labor in farming system by providing incentive for them.

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