

ANALYSIS OF GENDER DIFFERENTIALS IN SWEET POTATOES PRODUCTION OUTPUT IN OSUN STATE

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ABSTRACT

The research investigated the determinants of gender differentials in the output of male and female sweet potatoes farmers in the study area. Specifically, the study examined the socio economic characteristics of the sweet potatoes farmers, the sweet potatoes farming activities done by the genders, the efficiency estimates of the farmers and factors that determine gender outputs in the study area. The survey was undertaken using a well structured questionnaire.

Sixteen (16) sweet potatoes producers were randomly selected from the provided list with equal number of male and female sweet potatoes producers to arrive at a total sample of eighty (80) respondents. The data analyses were carried out with descriptive statistics and Cobb-Douglas production function. Land clearing, preparation and ridging was found to be done by 90%, 87.5% and 93.8% of the male and 12.5%, 35.0% and 10.0% of the females, respectively. The analysis of the mean output in kg per hectare of the male and female sweet potatoes farmers show the differences in their mean output.

The efficiency distribution shows that male operate at the efficiency range lower than that of the females. The study reveals that women are more interested and committed in sweet potatoes production. Farm size, quantity of input, depreciation, age, education, farming experience and other factors were found to affect output of all the respondents. It is therefore

Comment [mc1]: Gender Analysis of Sweet Potato Production in Osun State, Nigeria

Comment [mc2]: Gender levels of potato production in the study area

Comment [mc3]: You could consider "Primary data was collected with the use of structured questionnaire"

Comment [mc4]: 'Farmers' for consistency

Comment [mc5]: Not explicit. How did you arrive at 80 respondents from the sixteen selected farmers? The list used was provided by who? ... the farmers' cooperative, ADP or ...?

Comment [mc6]: Descriptive statistics and Cobb-Douglas production function were used in data analysis

Comment [mc7]: Were

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Comment [mc9]: Interested in omitted to

Comment [mc10]: Farming or production?

Comment [mc11]: Be specific

31 pertinent that policy makers should pay attention to the female sweet potatoes farmers as they are
32 found to be more productive.

Comment [mc12]: No conclusions. Your recommendation is not sufficient. They should be based on specific findings of the research.

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34 **Key words:** Gender, Efficiency, Sweet potatoes.

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UNDER PEER REVIEW

56 INTRODUCTION

57 Food which is a basic necessity of every human being is scarce in its provision; and the
58 provision of such food is a source of concern to both man and woman (Ajayi and Laogun, 2005).
59 Household food security is very important as the women and the men have different but
60 complimentary roles and responsibilities in securing nutritional well-being for all members of the
61 household and the community (Spriggs, 2005). Complementary roles are evident in all activities
62 revolving around sweet potatoes (Ipomoea batatas) production especially across all the states in
63 Nigeria. Sweet potato is a creeper of the *convolvulaceae* family. It originated from Central America
64 and is widely grown as important staple food in most parts of the world.

65 Presently, Nigeria is the number one producer of sweet potato in Africa with annual output of
66 3.46 million metric tons (FAO, 2006), and globally the second largest producer after China. The crop
67 is grown for both human and animal consumption. It is the only crop among the root and tuber crops
68 that has a positive per capita annual rate of increase in production in sub-Saharan Africa (Tewe et al.,
69 2003). Sweet potato is efficient in the production of carbohydrate, minerals, vitamins and cash per
70 unit area and per unit time (Getahun and Terete, 2007).

71 Gender participation is a term that describes the roles and activities of men and women
72 according to traditions and beliefs of a particular culture (Buckland, 1993). In most developing
73 countries men and women participate in traditional agriculture performing different roles. These
74 roles are gender specific, complimentary and reciprocal in natural activities like bush clearing,
75 land preparation, harvesting, processing and marketing (Brearley, 2001). Tewe (2003) reported
76 that if the contribution of men and women are taken into account equitably when allocating
77 productive resources, agricultural production can be on the increase, women gives certain food
78 crops such as cassava, sweet potatoes, maize, yam, melon etc. and are also responsible for
79 weeding, harvesting, transporting, processing, storage and marketing of their crops.

80 The problem of declining crop productivity in Nigeria is not expected given various
81 interventions by government and this have raised reactions among the scholars and practitioners.
82 Farmers output still fall below 60 percent irrespective of the interventions and to enhance this,
83 then, the means of production (i.e. technology) should be improved as well as other factors that
84 support the farmers output should be given adequate consideration (Ebong, et al. 2011; Anyanwu
85 and Zaka, 2011).

Comment [mc13]: Could be deleted

Comment [mc14]: Is Potato actually produced in all the states in Nigeria? Check your records and confirm.

Comment [mc15]: Could you reference the source of this information?

Comment [mc16]: Is cash here referring to Income? If so, could you consider; "minerals and vitamins, and a source of income per unit area and time"

Comment [mc17]: This could form a different sentence but rephrased to make more meaning.

Comment [mc18]: You may want to delete this part of the sentence.

Comment [mc19]: You may want to add this

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Comment [mc22]: adequate attention

86 Gender inequality remains a problem that has characterized the Nigerian agricultural
87 climate. In Southern part of Nigeria women are meant to do most of farm work and have
88 ownership of the farms while in the Northern men do most of the farm work and ownership of
89 farms. Given that gender roles are culture specific, it was revealed that in the middle belt region
90 of Nigeria women make ridges and mounds while in the eastern part of the country that is
91 certainly a job for men (Walabai, 2005). Gender responsibilities and difference have not
92 been adequately considered by policy makers and extension workers in many developing
93 countries. Gender differences tend to have a lot to do with farming responsibilities as it influences
94 the farming activities performed. Farming incentive distribution tends to be done in gender
95 insensitive manner (Jacoby, 1992). Policy makers and administrators work with baseless
96 assumption that women play supportive role to the men who are the actual farmers (Abdulai and
97 Regmi, 2000).

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Comment [mc26]: A bit clumsy. You could consider "The allocation and distribution of farm incentives are done with gender bias."

98 Women farmers like their male counterpart, need all the necessary training and support
99 to enhance their output (Olagunju and Ogunniyi, 2003). The transformation of traditional or
100 peasant sweet potatoes farming of which women are the life blood is very important to increase
101 their output. Hence the study analyzes the gender differentials in the output of sweet
102 potato farmers in Osun State, Nigeria. The major objective of this study is to analyze the socio-
103 economic characteristics of the respondents, ascertain various activities performed by male and
104 female sweet potato farmers, analyze the mean output of the male and female sweet potatoes
105 farmers in the study area, examine the differences in the efficiencies of male and female sweet
106 potato farmers and to determine the factors affecting the output of the male and female sweet
107 potato farmers.

Comment [mc27]: You may want to use a more appropriate word or phrase.

Comment [mc28]: You may delete

Comment [mc29]: If you consider the suggested topic, you may recast the sentence. "This study therefore made gender analysis of Sweet Potato production with the view to analyzing the socio-economic....."

108 METHODOLOGY

109 A multi-stage sampling technique was used in selecting respondents for the study. Osun
110 state was selected purposively based on the dominance of sweet potatoes farmers in the area than
111 other States. A sample of five (5) Osun State Agricultural Development Programme (ADP)
112 zones was purposively chosen so as to concentrate on the sweet potato farmers. The listing of
113 the sweet potato farmers in the chosen zone was done with the assistance of the OSADEP Staffs.
114 Sixteen (16) sweet potatoes producers were randomly selected from the provided list with equal
115 number of male and female sweet potatoes producers to arrive at a total sample of eighty (80)
116 respondents. A structured questionnaire was developed based on the objectives of the study to

Comment [mc30]: I do not know if 5 ADP zones in the state could be considered a sample. Samples are chosen from the population. How many ADP zones do you have in the state that informed the sampling of 5 out of the total number? You may recast the sentence to represent your intention.

Comment [mc31]: You may consider "A two stage sampling technique was used in selecting 80 respondents. In stage one, the 5 agricultural zones in the state were selected for ease of administering the questionnaires. In stage two, 16 respondents were randomly selected from each zone from the list of potato farmers provided by ADP". You may want to specify what ADP and OSADEP stand for.

117 collect information from the respondents. Cross-sectional data were collected from these
118 samples in 2010/2011 cropping season. The data analyses were carried out with descriptive
119 statistics and Cobb-Douglas production function.
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Comment [mc32]: Could you specify the implicit and explicit forms of the function.

121 RESULTS AND DISCUSSIONS

122 The result of the socio-economics characteristics of the respondents in Table 1 shows that
123 the mean age of the female sweet potatoes farmers (53.90) are more than the mean age of their
124 counterparts (52.60) with the youngest age of 22 years and the oldest of 74 years. It was
125 discovered that about 85% of the farmers are within the age range of 41 and 75 years while 15 %
126 are below 41 years. This result indicates that most of the farmers are still in their productive
127 years. It was also noticed that most of the young adults are not actively involved in the
128 production of sweet potatoes in the study area which might be due to rural urban drift. This
129 situation is most common with the male farmers than their female counterparts with the aim of
130 getting more lucrative jobs in cities rather than farming in the villages. This result has policy
131 implication. Nigeria has been recognized to have high rural-urban dichotomy. The number of
132 rural inhabitants that migrate to cities with hope of overcoming powerlessness consistent with
133 rural life is unprecedented (Adewumi, 2008). Majority of the male farmers had spent an average
134 of 10 and half years in school while the female farmers had only spent an average of 4 years in
135 school. The result implied that majority of these sweet potatoes farmers did not have the quality
136 education necessary for efficient performance in their chosen farming career and also a reflection
137 of quality of labour. This may therefore be responsible for low level of innovation and
138 technology adoption by the farmers and possibly failures of keeping good records.

Comment [mc33]: The age range is wild and may not give room for proper reporting. I do not know if in agriculture 60 years and above could be seen as productive ages. Check your records and confirm.

Comment [mc34]: Which is?

Comment [mc35]: I guess "Migration". Use appropriate words.

139 The average family size for male and female sweet potatoes farmers are 7 and 6
140 respectively. It is believed that production increases if there are more members of the household
141 within the productive age of 18-40. Family size is an important source of family labour since it
142 implies a reduction in the cost of hired labour. The mean years of experience for the two
143 categories are high enough to categorize them as being expert in the production of sweet potatoes
144 in the study area. This result implies that the farmers were experienced and not just amateurs.
145 The average land size cultivated by male and female sweet potatoes farmers are 2.6ha and 2.0ha
146 respectively. About 65% of the respondents cultivated below this average, which implies that

Comment [mc36]: If most of the family members are youths who would have migrated, would family size still be of much implication to Sweet Potato production? Clarify to avoid contradictions.

147 they grow sweet potatoes on small scale, and the likely implication of this is low productivity.
148 Women generally own less land and the land they have is often of lower quality than the land
149 owned by men. According to the Christian and Pinstrip (2008), women in Africa only own 1 per
150 cent of the land and they have to contend with limited access to financial and technical resources.

151 Majority of the male sweet potato farmers (72%) were involved in land clearing
152 activities while only 10% of the female respondents were also involved. Land preparation was
153 done by 70% of the male and 28% of the female respondents. Ridging was done by 75% of the
154 males and 8% of the females. This is in line with the findings of Tewe (2003) in the study of
155 trends in Sweet potato Production, Utilization, and Marketing in Nigeria in which it was revealed
156 that land clearing and preparation for sweet potato production was done mostly by men.
157 Planting was done by 15% of the males and 76% of the females. About 22% and 55 % of male
158 and female respectively participated in weeding. Majority of the males (76%) were involved in
159 harvesting while 22% of the females were also involved in harvesting. In marketing activity,
160 27% of the males were involved whereas 62% of the females were into sweet potatoes produce
161 marketing. The results indicated that the gender participation in marketing activity of sweet
162 potatoes is still at the rudimentary stage. The result revealed also that majority of the farmers are
163 peasants and with very few in commercialize operations.

164 The results from Table 3 show that there is need to address the problem of gender
165 inequality by directing attention toward resources for women farmers. The deterioration of
166 conditions for granting credit with the situation of women in the agricultural sector or the access
167 of credits to women was already complicated. Many women who have had to rely on personal
168 savings, with all its limitations, for productive investment, could be affected by the credit crunch
169 due to tightening of it downstream. Women's lack of access to finance is also due to factors such
170 as lack of collateral, complicated administrative procedures, unsuitable loan sizes or interest rates,
171 is one of the major factors affecting and limiting the investment and productive capacity of
172 women workers as well as their ability to finance other basic and strategic needs. This is likely to
173 affect small traders, work on family farms in exchange for maintenance are likely to receive less
174 support in the future. The availability of adequate and well-targeted resources will help
175 women farmers increase their productivity, providing more food for families and reducing the
176 demand for imports. Examples of ways to help women include expanding their access to credit
177 and inputs, as well as technical assistance. This strategy has big payoffs. The analysis revealed

Comment [mc37]: May

Comment [mc38]: inadequate

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Comment [mc41]: Potato farmers

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Comment [mc43]: This is confusing.

178 from Table 4 shows that there was a higher output of sweet potatoes from female farmers than
179 male farmers because women are the major producers of sweet potatoes in the study area. By
180 these estimates, agricultural productivity would rise if women farmers' access to inputs, credit
181 and technical assistance were equalized with men's.

Comment [mc44]: in

182 Women farmers took sweet potatoes farming as a business while the men were involved
183 either as helpers to the woman or to assist the household consumption. It was observed that a
184 little number of male took sweet potatoes business as a serious one. This result is in sharp
185 contrast with the assumption that women only play supportive roles in farming business (Abdulai
186 and Regmi, 2000). Cooperatives societies have a role to play in alleviating the problem of
187 agricultural funding, and paving the way towards recovery that is socially and economically
188 sound and sustainable. Where access to credit is becoming restricted, cooperatives can continue
189 as providers of financial services. Where public service delivery is jeopardized as a result of
190 crisis-induced cuts in funding and spending, cooperatives can play a bridging role as service
191 providers (e.g. health cooperatives), while at the same time providing employment opportunities
192 to women and men.

Comment [mc45]: Sweet Potato farming or Business. Be consistent. Refer to your topic.

193 From Table 4, the total output in naira per year for the male and female sweet potato
194 farmers sampled are ₦8, 327,443 and ₦12, 336,472 respectively. The mean output in naira for
195 the male and female sweet potatoes farmers sampled is ₦ 208,186 and ₦ 308,411
196 respectively. The Female farmers realized better output than the males, to further substantiate this
197 fact; Table 5 shows the productivity estimates of the male sweet potatoes farmer with a
198 minimum value of 0.100, mean value of 0.541, and the maximum value of 0.963. The range of
199 the efficiency estimates shows that about 48 percent of the estimates have less than 0.50. The
200 percentage of 12.5 and 7.5 of the estimates are within the range of 0.60-0.69 and 0.70-0.79
201 respectively. Also, 7.5 percent and 5.0 percent efficiencies estimates were within the ranges
202 0.80-0.89 and >0.89 respectively for male gender. The distribution refers that majority (48%) of
203 the male sweet potatoes farmers lie within the efficiency rating of <0.50 in contrast with female
204 farmers with high efficiency rating of 38 % within the ranges of 0.7 - 0.79. The productivity
205 efficiency estimates of the female sweet potatoes farmers shows the minimum value of 0.100 and
206 the mean value of 0.796 with a maximum value of 0.963. About 5.0 percent of the farmers have
207 efficiency value of less than 0.50. Also, 12.5%, 37.50%, 25% and 12.5% of the female sweet
208 potatoes farmers had efficiency values with ranges of 0.60-0.69, 0.70-0.79, 0.80-0.89 and >0.89

Comment [mc46]: Would this enhance Sweet Potato production. Relate.

Comment [mc47]: There is a confusion here. Are the percentages representing the efficiency rate or the percentages of the male and female farmers who attained certain levels of efficiency represented by the ranges quoted? Clarify.

209 respectively. This distribution inferred that the majority were within the efficiency rating of 0.70-
210 0.79. The result implied that the female farmers are efficient operators in sweet potatoes farming
211 than the males.

212 The result from Table 6 shows that there are minimum likelihood of the estimate of the
213 Cobb-Douglas function for female gender output, the coefficient of farm size, quantity of sweet
214 potatoes vines in Kg, quantity of agrochemical and depreciation of capital. The coefficient of
215 farm size, quantity of sweet Potatoes vines and quantity of agrochemical in Kg were all
216 significant at 1% probability level and were all positively related with sweet potatoes output.
217 This was buttressed by the elasticity values of 4.63, 4.93, and 184 respectively. These values
218 indicated that the household sweet potatoes productivity is still at the second stage of production
219 and increasing the use of any of these inputs will result to greater future productivity among the
220 female sweet potatoes farmers.

221 The efficiency factors affecting the productivity of the female farmers included farming
222 experience, marital status, number of extension visits and household size. Age related negatively
223 with efficiency of productivity but was not significant. The result implied that old age will
224 reduce efficiency. The analysis further shows that, the coefficient of marital status was
225 significant at 1% probability level and has positive relationship with efficiency. That implied that
226 marital status is an incentive in terms of increased labor force to sweet potatoes production in the
227 study area. Also the years of experience was significant at 1% probability level and has positive
228 relationship with efficiency of productivity. This shows that increase in the years of experience
229 increase productivity efficiency. Also number of extension agent visit and household size were
230 also significant at 1% probability level and both had a positive relationship. Thus, the more an
231 extension agent visit the farmer with productive innovations and that is adopted by the farmer the
232 productive and efficient the farmer will be.

233 Table 7 shows that there is minimum likelihood of the estimate of the Cobb-Douglas
234 function for female gender output. The coefficient of farm size and quantity of sweet potatoes vine
235 input available were significant at 1% probability and they were all positively signed. This
236 implied that increase in the availability of farm land and sweet potatoes vine input for the
237 farmers, leads to increase in the farm output. Furthermore, labor (man days) was significant at
238 1% probability and negatively signed. The implication of these results is that increase in labor
239 man days will lead to decrease in productivity because of drudgery.

Comment [mc48]: Is this appropriate. Clarify the meaning.

Comment [mc49]: How? Are the activities exhausting and tiring, boring or unpleasant. Confirm.

240 The efficiency factor affecting the productivity included age, education status, marital
241 status, extension visits and household size. Age related negatively with the efficiency of
242 productivity and it is significant at 1% productivity level. The implication is that ageing is in
243 consonance with inefficiency. Educational status, marital status, and number of extension visits
244 and household size related positively with efficiencyproductivity. The implication is that increase
245 in these factors will result to increase efficiency in productivity of the male sweet potato^{es}
246 farmers in the study area.

Comment [mc50]: includes

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248 CONCLUSION AND RECOMMENDATIONS

249 The study has highlighted that there are gender differential in the output of male and
250 female sweet potato^{es} farmers in the study area. It was revealed that the female produced more
251 output than their male counterparts. This implies that the female took sweet potatoes farming
252 more seriously and did not play a supportive or complimentary role to their male counterparts.
253 The women were found to be more technically efficient, this may be as a result of their
254 commitment to sweet potatoes farming.

255 Both the male and female participated in sweet potato^{es} farming activities. The males
256 were more involved in sweet potato^{es} farming activities such as land clearing, land preparation
257 and ridging while the female were more involved in sweet potatoes farming activities such as
258 planting, harvesting and marketing.

259 It is therefore, recommended that agricultural extension agencies should intensify efforts
260 in disseminating improved production technologies especially to the women to support their
261 efforts in sweet potato^{es} farming. Government should provide sweet potato^{es} farming inputs and
262 ensure that female farmers get a fair share of the inputs. There should be more investment in
263 sweet potato^{es} farming since it as a source of self employment especially for women, as this will
264 help the government in the fight against gender imbalance and shortage of employment. In order
265 to achieve rural development in Nigeria, which is to increase rural productivity and income, there
266 is need to enhance the quality of life of women sweet potato^{es} farmers and meet the extension
267 service needs of women farmers in sweet potatoes production.

268 Strengthening the role of women in agriculture and ensuring decent work for a
269 growingnumber of women is one step to help economies to get back on track. This would help
270 toreach the goal of halving the share of poor people. The list of possible measures

271 includes:increasing women's access to farming land and fertilizers, credit, and education;
272 increasingwomen's participation in decision-making; and strengthening women's role within the
273 family.All these measures are crucial to guaranteeing high productivity and improving the
274 nutritionalstatus of children.

Comment [mc51]: Fine tune your recommendations with the specific findings of the study.

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UNDER PEER REVIEW

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Table 1: Mean values of socio economic characteristics of the respondents in the study area

Item	Male	Female	Both Sexes
Age (years)	52.60	53.90	53.25
Land area (ha)	3.62	3.02	3.32
Labour (man-days)	19.30	7.50	13.40
Education (years)	10.54	4.23	7.39
Family size (No)	7.40	6.80	14.20
Fertilizer (Kg)	766.53	346.84	556.69
Planting material (₦)	25, 436.00	19, 324.00	22, 380.00
Capital (₦)	55, 334.00	28,657.00	41, 995.50
Farming experience	8.00	6.50	7.25
Tractor use	40%	10%	25%
Loan recipient (%)	73%	68%	70%
Membership of cooperative society	68%	90%	79%
Care Economy: hours spent on the farm/day	6.00	3.30	4.65
hours spent on children	2.00	5.00	3.50
hours spent on food making/water fetching	.30	6.30	3.50

Source: Field Survey, 2011

Comment [mc52]: You may ignore this if it had no noticeable effect on Production.

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Table 2: Distribution of Activities Performed by the Respondents

Activities Performed	Male	Female
Land Clearing	72 (90)	10 (12.5)
Land Preparation	70 (87.5)	28 (35.0)
Ridging	75 (93.8)	8 (10.0)
Planting	15 (18.8)	76 (95.0)
Fertilizer Application	38 (47.5)	72 (90)
Weeding	22 (27.5)	58 (72.5)
Harvesting	76 (95)	22 (27.5)
Marketing	27 (33.8)	62 (77.5)

365 **Source: Field Survey, 2011**
366 Note: Multiple Responses were observed
367 Percentages are in parenthesis
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377 **Table 3: Distribution of Respondents According to Farm Inputs Sources**

Characteristics	Male		Female	
	Freq.	Percent	Freq.	Percent
I. Source of Planting Materials				
Purchased	5	12.5	3	7.5
Own Farm	18	45.0	22	55.0
Friends and relatives	6	15.0	2	5.0
Friends and relatives/Own farm	11	27.5	13	32.5
Total	40	100.0	40	100.0
II. Source of Land				
Inherited	19	47.5	1	2.5
Purchased	2	5.0	0	0.0
Rent	11	27.5	21	52.5
Family land	8	20.0	18	45.0
Total	40	100.0	40	100.0
III. Source of Capital				
Personal savings	14	35.0	19	47.5
Cooperative society	8	20.0	3	7.5
Cooperative/personal savings	5	12.5	6	15.0
Friends and relatives/personal savings	11	27.5	12	30.0
Banks	2	5.0	0	0.0
Total	40	100.0	40	100.0
IV. Fertilizer usage				
Used	18	45.0	8	20.0
Not- used	22	55.0	32	80.0
Total	40	100.0	40	100.0

378 **Source: Field Survey, 2011**

Comment [mc53]: Alignn your tables well. The figures in the percentage column are not corresponding with the characteristics for sources of capital and fertilizer usage.

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381 **Table 4: Distribution of the Male and Female Sweet Potatoes Producers' Output**

Variables	Male	Female
Number of respondents (n _i)	40	40
Total Output (X1)	8,327,443	12,336,472
Mean Output (X2)	208186.08	308411.80

Comment [mc54]: Production. The output is measured in what?..Tons, Kg or...?

382 **Source: Field Data, 2011.**

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386 **Table 5: Frequency Distribution of Male and Female Gender Efficiency**
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Technical Efficiency	Male		Female	
	Frequency	Percentage	Frequency	Percentage
<0.50	19	47.5	02	5.0
0.5 - 0.59	08	20.0	03	7.5
0.6 – 0.69	05	12.5	05	12.5
0.7 – 0.79	03	7.5	15	37.5
0.8 – 0.89	03	7.5	10	25.0
>0.89	02	5.0	05	12.5
Total	40			
Min	0.100		0.100	
Max	0.963		0.963	
Mean	0.541		0.796	

Source: Field Survey, 2011

418 **Table 6: Cobb-Douglas Frontier Function Estimation of Female Gender Output**

Production function	Parameter	Coefficient	Standard error	t-value
419 Constant	b ₀	35.871	0.842	42.602***
420				
421 Farm size	b ₁	0.463	0.024	19.292***
422				
423 Labour (Mandays)	b ₂	-1.167	4.656	-0.251
424				
425 Quantity of sweet 426 Potatoes vines 427 in Kg	b ₃	4.927	0.632	7.436***
428				
429 Depreciation of 430 Capital	b ₄	-0.546	0.014	-37.655***
431				
432 Distance travelled	b ₅	-0.416	0.882	-0.4719
433				
434 Quantity of 435 agrochemicals	b ₆	1.844	0.265	6.958***
436				
437 Efficiency factor				
438				
439 Educational status in 440 Years	Z ₁ 0.075	0.665	0.1127	
441				
442 Age in years	Z ₂	-0.056	0.308	-0.182
443				
444 Farming experience	Z ₃	0.382	0.098	3.897***
445				
446 Extension visits	Z ₄	8.498	0.689	12.334***
447				
448 Marital status	Z ₅	6.212	0.739	8.406***
449				
450 Household size	Z ₆	11.221	0.872	12.334***
451				
452 Credit availability	Z ₇	1.625	3.615	0.449
453 Membership	Z ₈	0.624	2.314	0.269
454 Association				
455				
456 Diagnostic statistics				
457				
458 Sigma	Q ² 19.472	3.614	5.387**	
459				
460 Gamma	Y	0.500		
461				
462 Log likelihood function	η	-110.314		
463				
464 LR test		12.003		
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466 **Source: Field survey, 2011**

467 ***, **, * = 1%, 5%, 10% level of probability

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Table 7: Cobb-Douglas Frontier Function Estimation of Male Gender Output

Production function	Parameter	Coefficient	Standard error	t-value
Constant	b_0	14.636	6.850	2.131***
Farm size	b_1	3.854	0.985	3.913***
Labour (Mandays)	b_2	-13.295	2.643	-5.030***
Quantity of potatoes Vine in Kg	b_3	10.644	1.552	6.856***
Depreciation of Capital	b_4	-2.498	0.014	-37.655***
Distance travelled	b_5	-0.416	1.998	-1.250
Quantity of agrochemicals	b_6	0.864	0.124	6.971***
Efficiency factor				
Educational status in Years	Z_1	-0.411	0.498	-3.385
Age in years	Z_2	-0.044	0.013	-3.385
Farming experience	Z_3	0.255	0.113	2.257***
Extension visits	Z_4	8.191	1.002	8.175***
Marital status	Z_5	9.997	0.813	12.296***
Household size	Z_6	12.011	0.887	13.541***
Credit availability	Z_7	0.772	3.992	0.193
Membership Association	Z_8	0.626	0.558	1.122
Diagnostic statistics				
Sigma	σ^2	28.665	2.942	9.743**
Gamma	γ	0.500		
Log likelihood function	η	-110.314		
LR test		12.006		

Source: Field survey, 2011

***, **, * = 1%, 5%, 10% level of probability

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Comment [mc55]: Spelling differs with the in-text reference. Check and correct.

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