SOCIO-ECONOMIC FACTORS AFFECTING KNOWLEDGE TRANSFER TO MAIZE GROWERS IN KILINDI DISTRICT, TANZANIA

Asheri M. Mwidege*

Anna C. Mcharo**

Abstract

The interaction between extension agents and farmers and the extent to which farmers perceived extension agents as useful to them is paramount to bringing about change in agriculture output. However, little information is available on the socio-economic factors affecting knowledge transfer to maize Growers in Kilindi District necessary to enable them grow maize and obtain higher yields is unknown. Therefore, the present study was conducted to assess socio-economic factors affecting knowledge transfer to maize farmers in Kilindi District. Data were collected from 121 households, by using interview schedule in which cross-sectional multi-stage and purposive approaches were employed. Both descriptive and quantitative techniques were used to analyse cross-sectional data. The quantitative estimation employed multiple linear regression models to estimate perceived effectiveness in Knowledge transfer. Results show that age, household size, farm size, and AEAs contact had significant influence on technological transfer on maize growers in the study area. It was therefore recommended that local government should make compulsory equitably distribution of agricultural extension services in rural areas on how to use new technology to maximize yield hence increase income.

Key words: Socio-economic factors, knowledge transfer, agricultural extension services, maize growers and Kilindi District

* Mbeya University of Science & Technology, Science and Business Management Department

** St. Agrey Teachers' College, Mbeya

1.0 Introduction

Agriculture plays an important role in reducing poverty and serves as an engine for growth in developing countries. Additionally, it contributes in socio- economic well being of the people through food production and employment (Diao, 2007). It is estimated that 70% of the labour force in sub-Saharan Africa (SSA) work in agriculture while over 75% of the labour force in Tanzania are employed in the same sector which its growth rate is 4.4% (United Republic of Tanzania, 2012). Based on its importance, several countries in SSA including Tanzania have put efforts to improve the sector. These efforts include the provision of extension services to change farmers' attitude so as to enhance their efforts on productivity (Allahyari and Chizari, 2010).

Agricultural extension services have an important role in increasing quality of the production (Hossein *et al.*, 2008). The agricultural extension agents (AEAs) intervenes to bring about change by providing the knowledge and information that enable farmers to understand and adopt particular practices (Allahyari and Chizari, 2010). Additionally, they play a vital role in technology transfer and promote technology development (Allahyari and Chizari, 2010; Moris, 1991). Extension facilitation is difficult and potentially a costly undertaking that is regularly provided by the government and partly by private agents. As argued by Glendering *et al*. (2010) that a government will invest in extension if it believes it has value to achieve government goals or farmers needs such as increasing food production, stimulating economic growth, increasing the welfare of rural household farmers and promoting sustainable agriculture.

The interaction between the extension agents and the farmers and the extent to which farmers perceive extension agents as useful to them is vital to bringing change in agriculture output and could explain the dynamics embedded in advices adopted by farmers in a given locale (Daniel, 2013). For example, the frequency of contact by extension agents is crucial because it is through this that, vital and useful information about improved and recommended agricultural practices are disseminated to farmers (Allahyari and Chizari, 2010). The amount or type of useful information disseminated to farmers could be used to determine the effectiveness of extension agents in transferring knowledge needed by farmers to improve production.

Accordingly, Kilindi District efforts have been made to provide agricultural extension services to farmers growing maize through provision of input subsidies, training farmers and provision of advisory on proper agronomic practices. Despite these efforts, adoption of maize agronomic practices is still low leading to low productivity (MAFC, 2012). Little is known about the effectiveness of the AEAs in providing advisory services on proper agronomic practices to maize growers. Therefore, this study intends to investigate the perception of farmers on how they view their extension agents on their effectiveness in transferring knowledge to maize growers in Kilindi District.

2.0 Problem statement

Traditional farming is the most predominant practice adopted by many farmers in Kilindi District. It has been noted that, maize yield trend has been declining, whereas in 2008/2009 total National production was 3 424 984 metric tons while the actual demand was 4 131 782 metric tons making a deficit of 706 797 metric tons (MAFC, 2009). The blaim on the observed decline in maize

productivity was caused by dependency of farmers on traditional technology and producing mainly for subsistence (Daniel, 2013). Based on this, a wide range of policies, strategies, and approaches were formulated by the Tanzanian government to reverse the worsening food and agricultural trends towards sustaining agricultural growth. These included, introducing a range of agricultural initiatives such as Agricultural Sector Development Strategy (ASDS), District Agricultural Development Projects (DADPs), District Agricultural Sector Investment Project (DASIP), Participatory Agricultural Development and Empowerment Project (PADEP), Agriculture Sector Programme Support (ASPS), and Kilimo Kwanza (URT, 2009).

Despite all these efforts, farmers seem to have not benefited from agricultural sector initiatives and maize growers of Kilindi in particular seem to have failed to benefit from services delivered by agricultural extension agents under the introduced initiatives. According to a claim put forward by Saidia *et al. (*2010), maize growers in rural areas have been experiencing low yields per unit area and this has been attributed by lack of extension services, as a result, over the years farmers have continued using their traditional methods in producing maize which leads to low yields. This study therefore assessed farmers' perceptions on the effectiveness of extension agents in knowledge transfer to maize farmers in Kilindi District.

3.0 Research methodology

3.1 Description of Study Area and sampling frame

This study was conducted in Mangidi, Tuliani, Msente, and Michungwani villages in Kilindi District. This study adopted cross-sectional research design because researcher observed at one point in time and usually the simplest and least costly alternative (Newman, 2007). Similarly,

Babbie (1990) argues that cross-sectional research design is suitable for description purposes as well as the determination of relationship between variables and it is cost effective and saves time. Village registries were used as a sampling frame in which representative households farmers engaged in maize production in four villages were selected in Kilindi District.

3.2 Sampling procedure

Multi-stage random and purposive sampling approach was used to select a representative sample of maize growers, because respondents chosen were believed to be good source of information and possessed varied experience in the village to represent farmers in the district (Krysik and Finn, 2007). The first stage involved a random selection of two divisions out of four. The second stage involved a random choice of two wards in which Jaila and Mabalanga were selected. The last stage involved a random selection of four villages from selected wards. This method gives no room to biasness and the degree of the accuracy obtained allowed for making inference applicable to a wider population (Saunders *et al.*, 2009). Purposive sampling was used to select maize growers from four villages to ascertain the perceptions of AEAs from family households' viewpoint as a unit of assessment. A sample size of 121 was collected from four randomly selected villages in which about 30 maize growers were interviewed from each village.

3.3 Data Collection

Both primary and secondary data on perception of farmers on effectiveness of agricultural extension agents in knowledge transfer to maize growers were collected from Kilindi district. Combinations of both qualitative and quantitative methods were used in which primary data

was collected from maize growers using interview schedule questionnaires both open and closed ended questions were used to gather information.

3.4 Data Analysis

All variables with their respective values /codes was coded and posted into the computer spread sheet (SPSS version 16) and Stata version 10 for data analysis and synthesis. Data were analyzed to obtain descriptive statistics including frequencies, percentages, mean, and standard deviation. Adjusted R- square, t-statistic and variance inflation factors (VIF) was used to determine the goodness of fit of the model, measures standard errors the estimate is, and to detect the extent of multi-collinearity problem, respectively (Studenmund, 2001; Mukras, 1993).

3.6 Estimation of socio-economic factors influencing farmers' perceptions on effectiveness of AEAs in knowledge transfer

In order to ascertain the extent of relationship between farmers' perceptions on effectiveness of AEAs with their socio-economic characteristics, the present study used linear regression model, specified as Perceived Effectiveness in Knowledge Transfer (PEKT) as a function of Age of maize growers, sex, marital status, education level of maize growers, household size, land ownership, farm size, frequencies of AEAs visits to maize growers for knowledge transfer. Mathematically, this was summarized as follows:

$$PEKT = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

…… (1)

β_0 = constant term;

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$ = Coefficients of variables estimated

X_1 = Age of maize growers measured in years,

X_3 = Marital status (1 = Single, 2 = Married, 3 = Divorced, and 4 = Widow,

X_4 = Education level (1 = Informal education, 2 = Standard seven, 3 = Form six, 4 = Others),

X_6 = Land ownership,

X_7 = Farm size measured in hectare,

X_8 = Frequencies of AEAs visits farmers on seasonal basis, and

ε = Error term of variables not included in the regression model.

The model was tested for multi-collinearity problems and adjusted R-Square to estimate the model fit. Also, correlation and t-statistics was employed to estimate the degree of relationship and its extent of association between the dependent variable and predictor variables.

4.0 Results and discussion

4.1 Descriptive statistics

4.1.1 Age category, sex and marital status of respondents

Study results showed that 54.5% and 15.7% (Table 1) of the households interviewed were aged between 30-44 and 15-29 years, respectively. This indicates that respondents in these age categories were mostly likely to participate in maize production as compared to those aged sixty years and above.

Table 1: Age category, sex and marital status of respondents

Age category	Frequency	Percent
15 - 29	19	15.7
30 - 44	66	54.5
45 - 59	17	14.0
60 - 74	11	9.1
75 - 90	8	6.6
Sex		
Male	65	53.7
Female	56	46.3
Marital status		
Single	7	5.8
Married	98	81.0
Divorced	12	9.9
Widow	4	3.3
Total	**121**	**100**

Findings showed that maize growers interviewed from the study area, 53.7% and 46.3% are male and female, respectively. These proportions of respondents suggest that males are more likely to participate in maize production than their counterparts. Probably, males have higher chances of accessing land and farm inputs than female respondents. Also, results (Table 1) showed that 81% and 9.9% of the respondents were married and divorced. Meaning that married respondents were the most participants in maize production in the study area. This could be attributed to the necessity of the married counterparts to meet family basic needs such as food self-sufficiency.

4.1.2 Household size distribution and Education level of respondents

Findings (Table 2) showed that, 57% and 24% of interviewed respondents had households size ranging from 5-8 and 1- 4, respectively. This indicated that majority of households in the study area have large household size in the category 5- 8 and are more likely to participate in maize production than other categories so as to meet food requirements. The results show that 69.4% of

respondents interviewed attained primary education level while 27.3% have informal education. These suggest that primary education leavers were likely to participate more in maize production followed by those with informal education. Probably, the majority of maize production participants have low chances to search for highly paying job opportunities in urban areas as compared to those with higher education levels.

Table 2: Household size and Education level of respondents

Household size distribution	Frequency	Percent
1 - 4	29	24.0
5 - 8	69	57.0
9 - 12	18	14.9
13 -16	5	4.1
Education level		
Informal education	33	27.3
Standard seven	84	69.4
Form four	3	2.5
Form six	1	0.8
Total	121	100

4.1.3 Respondents income category and their sources

Finding showed that 39.7% and 31.4% of respondents have income between 100 000 - 250 000 and 251 000 - 400 000. Results indicated that 71.1% of maize growers have low income 100 000 to 400 000 TZS (U$64.50-258.06) per year compared to 2.5%. This could be attributed to low earned income due to low maize yield caused by inability to access agricultural extension services to enhance maize productivity. Also**,** results in Table 3 showed that 99.2% of respondents depend on farm activities. This suggests that the majority of respondents entirely depend on farm activities as their source of income. Probably, this could be attributed by lack of off-farm employment opportunities in the study area.

Table 3: Respondents income category and their sources

Income category (TZS)	Frequency	Percent
100 000 - 250 000	48	39.7
251 000 - 400 000	38	31.4
401 000 – 550 000	11	9.1
551 000 – 700 000	7	5.8
701 000 – 900 000	14	11.6
1 151 000 - 1 300 000	3	2.5
Source of income		
Farm activities	120	99.2
Business	1	0.8
Total	**121**	**100**

4.1.4 Farming experience on maize production

Findings showed that 46.3% and 43.0% (Table 4) of respondents had an experience between 1 - 15 and 16-30 years in maize production in the study area. This indicates that experience depends on the number of years respondents have been practicing maize cultivation. This indicates that as experience exceeds 30 years, participation in maize production tends to diminish. Probably, this could have been attributed by low profit obtained from maize farming compared to costs incurred.

Table 4: Respondents farming experience on maize production (n=121)

Experience (Years)	Frequency	Percent
1-15	56	46.3
16-30	52	43.0
31-45	8	6.6
46-60	5	4.1
Total	121	100

4.1.5 Agricultural extension services (AESs)

Findings (Table 5) showed that 77.7% and 6.6% of respondents interviewed access AESs between two to five and 10-13 kilometers from surveyed villages. Findings indicate that the

minimum distance to access extension services by maize growers from the study area is two kilometers meanwhile the furthest distance is 13 kilometers. It is therefore costly for maize growers to access information and this could be attributed to poor extension services distribution in the study area. Present study findings are supported by key informants who reported that AEAs have to serve four to six villages whereby villages are so scattered.

Table 5: Distance of accessing agricultural extension agents (n=121)

Distance in KM	Frequency	Percent
2 - 5	94	77.7
6 - 9	19	15.7
10 - 13	8	6.6
Total	**121**	**100.0**

4.1.6 Frequency of contact with extension agents

Table 6 shows that 84.3% and 15.7% of respondents never have the respondent had or rarely have they had contact with extension agents on seasonal basis. Present findings reveal that the majority of maize growers in the study area have no contact with AEAs at all in seasonal basis; however, the minorities of them infrequently have a contact. These suggest that the extension services are costly to access; this could have been attributed by unreliability of AEAs. That's why the majority almost never have contact with extension agents for improvement of maize production in the study area. Also, this was supported by focus discussion groups that they never have contact with AEAs on seasonal basis.

Table 6: Number/frequency of contact with extension agents on seasonal basis (n=121)

Frequency of contact	Frequency	Percent
Rarely	19	15.7
Never	102	84.3

4.1.7 Maize yield

Table 8 shows that 60.3% and 30.6% of respondents in the study area harvested between two to nine and 10-17 (0.2 – 0.9 and 1.0 -1.7 tons) in the production season 2011 / 2012. Meaning that, the majority of maize growers have the minimum yield of two bags of maize per season while the minority harvests a minimum of 26 bags (2.6 ton) per season. These findings suggest that maize yield in the same season varies between respondents. This could have been caused by variation in the ability to afford maize production technologies among maize growers.

Table 8: Maize production obtained (yield) in 2011/2012 (n=121**)**

Maize yield/bag of 100Kg	Frequency	Percent
2 - 9	73	60.3
10 - 17	37	30.6
18 - 25	10	8.3
26 - 33	1	.8
Total	121	100

4.1.8 Land cultivated for maize production in 2011/12

Results (Table 9) showed that 90.1% of respondents cultivated between one to four acres while 2.5% cultivated between 9 -12 acres. Meaning that the majority of maize growers cultivate small piece of land meanwhile only few of them cultivate between nine to twelve acres. This indicates that most of maize growers cultivate small pieces of land. This fact could have been attributed by lack of ability to buy farm inputs and poor accessibility to AEAs.

Table 9: Distribution of land cultivated for maize production in 2011/12 (n=121)

Acreage category of land	Frequency	Percent
1-4	109	90.1
5-8	9	7.4
9-12	3	2.5
Total	121	100

4.4 Quantitative estimation of socio-economic factors affecting knowledge transfer to maize Growers

Quantitative estimation of socio-economic effects on technological transfer reflects that there is no multi-collinearity problems since the variable inflationary factor (VIF) values fall in the range of 1.06 - 1.44. Also, the mode summary indicates 38.13% (adjusted R^2) of technological transfer in maize production is explained by socio-economic factors. Meaning that, there are other variables that can explain technological transfer in maize production in the study area. However, Gujarati (2004) argue that if R^2 is lower than 0.10 then the instruments are most likely to be inappropriate, though, low R^2 does not mean that the model is weak but the logical and theoretical relevance do matter.

Findings (Table 10) showed that age of respondents have negative significant effects ($p<0.01$) on technological transfer. This suggests that technological transfer decline as maize growers in the study area become older. This fact could have been attributed by the inability of aged respondents in accessing information and farm inputs. Contrary, Van den Berg (2013) observed that there were no significant relationships between adoption of improved technologies and farmer age in Limpopo Province.

Also, results indicated that household size have significant positive effects at ($p<0.05$) level on technological transfer. This indicates that there is a proportionate effect between technological transfer and household size of respondents in the study area. This suggests that as household size of maize growers increases, it leads to an increase in technological transfer so as to meet food self-sufficiency. Similarly, findings (Table 10) showed that farm size had strong and statistically

significant ($p<0.01$) and was inversely correlated with technological transfer. Meaning that as technological transfer is attained by 1%, respondents tended to reduce their farm sizes by 16.79%. This fact could have been attributed by the opportunity of maize growers to use little efforts in agricultural inputs to maximize outputs. Similar results were observed by Mignouna *et al.* (2010) that increased frontier maize output household size decreased inefficiency along with farm size.

Moreover, frequency of AEAs contact has strong positive significant effects ($p<0.01$) on technological transfer. This indicates that as 1% increase in AEAs contact with maize growers, it will lead to 168.81% increase in technological transfer. Therefore, frequency of contact between farmers and agricultural extension agents in the study area is a key determinant of technological transfer among other socio-economic factors. Study findings concur with observations made by Mignouna *et al.* (2010) and Allahyari and Chizari (2010) that there is a strong relationship between contact and technological transfer for improving the effectiveness of extension services through reliable information.

Table 10: Estimation of technological transfer regression on socio economic factors (n=121)

Variables	Coefficient	Std Error	t-value
Age	-0.0190	0.0065	2.90***
Sex	-0.0123	0.1884	0.07
Marital status	0.2590	0 .1961	1.32
Education level	0.0791	0.1330	0.59
Household size	0.0778	0.0349	2.23**
Land ownership	0.0704	0.0627	1.12
Farm size	-0.1679	0.0585	-2.87***
AEAs contact	1.6481	0.2651	6.22***
Constant	9.7431	1.2193	7.99

***, *** indicate significant levels at 5% and 1% respectively*

Model summary for analysis

Number of observations = 108; R-squared = 0.4276 Adjusted R-squared =0.3813;

Mean VIF =1.27

5.0 Conclusion and recommendation

The study found that age, household size, farm size, and AEAs contact have influence on technological transfer on maize growers in the study area. Therefore it is concluded that frequency of AEAs contact with maize growers is a key determinant of technological transfer. Based on this conclusion that AEAs contact with maize growers had strong influence on technological transfer, therefore it is recommended that the local government should enforce equitably distribution of agricultural extension services in rural areas.

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