CONTRIBUTION OF NATIONAL SERVICE ON AGRICULTURAL PRODUCTION: A CASE OF MAIZE PRODUCTION BY MGAMBO JKT IN HANDENI DISTRICT

George Mbiligenda*

Christopher Mahonge**

Abstract

National Service influences agricultural development in Tanzania but little attention has been given in this regard in the discussion of civil-military relations. This study examined the contribution of the National Service in agricultural production and used maize production by Mgambo National Service camp (Mgambo JKT) in Handeni District as the case study. Purposively, maize producing farmers near and far from Mgambo JKT were interviewed using a questionnaire in order to assess spillover effects of Mgambo JKT in the surrounding villages. The study revealed that Mgambo JKT has been increasing her capacity in maize seeds multiplication for hybrid varieties such as TMV-1and TAN-250. Contribution of Mgambo JKT in overall maize production in Handeni District has increased from 0.2% in 2008 to 0.7% in 2011. On the other hand, spillover effects of Mgambo JKT were observed as an impact of this National Service in agricultural production of the surrounding rural areas. Farmers have imitated conventional practices of Mgambo JKT such as proper spacing, row planting and use of improved seeds. As such, mean maize productivity of farmers near the camp was higher than of those far from the camp. However, in order to enhance its contribution to the surrounding communities, the National Service should establish outreach programs. The study recommends further research on the nexus between agricultural development and the contribution of national service in this respect because the present study focused on one national service camp only.

Keywords: National Service, Agricultural Production, Civil-Military Relations

* Development Studies Institute, Sokoine University of Agriculture, Box 3024 Chuo Kikuu Morogoro Tanzania

** Sokoine University of Agriculture Centre for Sustainable Rural Development, Box 3035 Chuo Kikuu Morogoro Tanzania

INTRODUCTION

Many countries in the world have established National Service for their citizens mainly the youth to serve their societies. National Service programmes have potential to forge a new sense of national community, rebuild the connection between the rights and responsibilities of citizenship and re-establish a sound civil military relationship (Grigsby, 2008). Tanzania National Service (JKT) is one among four commands of Tanzania People's Defence Force (TPDF). The need to establish National Service in Tanzania was pioneered by TANU Youth League whereby it was launched on 10th July 1963. Later on National Service in Tanzania was legally established under National Service Act of 1964 (URT, 1964). In 1975 National Service was amalgamated with TPDF. However unlike the other commands of TPDF, the main objective of Tanzania National Service is to build and prepare the youths to serve the nation (URT, 1964). Other objectives of the National Service are to train the young citizens to serve the nation in the spheres of social and economic development alongside the function of upbringing the youths in the defence of their country (URT, 1975).

Agriculture sector is considered to be a major economic activity in Tanzania. About 74 percent of the Tanzanian population mostly living in rural areas are engaged in agricultural production (Mnenwa and Maliti, 2010). Performance of agriculture sector in the share of GDP was recorded to be 24.6 percent under which the growth of crop subsector was recorded to grow by 3.4 percent in 2009 (URT, 2010). In Tanga Region, agriculture is the main economic activity under which major food crop grown is maize occupying a total of 315 882 hectares out of 436 725 hectares planted with annual crops and vegetables in the region. Handeni District is estimated to have the largest area planted with maize occupying a total area of 79 794 hectares followed by Kilindi 55 896 hectares and Korogwe 54 273 hectares while other districts have less than 50 000 hectares each (URT, 2012).

Tanzania National Service is one of the stakeholders in national development which creates a common ground for civil-military relations which in return provides a nexus of military and national development. Military-development nexus in Tanzania invites the necessity of the government, military and the citizenry to meet and pursue a common goal to realize development of several sectors such as agriculture. National Service is emerging to be one of the important

stakeholders for agricultural development in Tanzania. However, this important stakeholder has been ignored in the past and existing analyses on the roles of stakeholders in agricultural development in Tanzania. Little, if any, has been explored on non-military and non-political roles of Tanzanian military in the development of its society especially at the grassroots levels. One of the areas wherein the National Service's role has not been explored, in military-development nexus, is on its contribution to agricultural production. The aim of this study is, therefore, to determine the contribution of National Service in agricultural production and to assess the spillover effects of National Service camps on agricultural production to the surrounding communities and used maize production by Mgambo National Service camp, henceforth Mgambo JKT, in Handeni District as a case. Specifically the study: (i) determined maize production by Mgambo JKT; (ii) estimated the proportion of maize production by Mgambo JKT in overall Handeni District maize production; (iii) assessed the spillover effects related to maize production of Mgambo JKT to the surrounding villages; and (iv) compared maize productivity between farmers near and far from the Mgambo JKT.

MATERIAL AND METHODS

Study Area, Survey Methods and Sample Size: The study was conducted in Handeni District in which Mgambo JKT is located. Cross-sectional design was used whereby data were collected at one point in time from a sample chosen to represent a population. Mgambo JKT was purposively chosen as a case of National Service and it is among National Service camps specialized in crop-subsector such as maize production. Mgambo JKT is one of the National Service camps performing well in seed multiplication (URT, 2011a).

Purposively villages located near Mgambo JKT and far from Mgambo JKT were selected to assess spillover effects of the camp. In this study a sample size of 120 respondents was used. Sixty maize farmers were randomly selected each from both villages near and far from Mgambo JKT.

Data Analysis

Unit of Analysis, Qualitative Data Analysis and Quantitative Data Analysis: Units of analysis were Mgambo JKT and maize farmers near and far from Mgambo JKT. Content analysis was used to analyse qualitative information gathered through key informant interviews

and focus group discussions whereas quantitative data collected using a questionnaire were analysed using SPSS. The qualitative data were categorized into meaningful units and themes in keeping with the research objectives. Charts and a trend line were used to summarize quantitative results. Independent t-test was used to test significant difference in mean maize productivity between maize farmers near and far from Mgambo JKT. The equation used for t-test was:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s_{X_1X_2} \cdot \sqrt{\frac{2}{n}}}$$

Where:

n= sample size

$\bar{X}_1$ and $\bar{X}_2$ = sample mean for farmers from a village near Mgambo JKT and for those from a village situated far from the camp respectively

$s_{X_1X_2}$ = the grand standard deviation, 1 = farmers from a village near Mgambo JKT, 2 = farmers from a village situated far from Mgambo JKT.

RESULTS AND DISCUSSION

Maize Production by Mgambo JKT

Farming Practices

Mgambo JKT practices a commercial farming in maize production whereby in partnership with seeds companies such as Agricultural Seed Agency (ASA) and Tanzania Seed Company (TAN-SEED), the camp is multiplying improved maize seeds such as TMV-1 and TAN-250 for ASA and TAN-SEED respectively. However, this commercial farming is a rain fed agricultural practice.

Mgambo JKT being a training camp offers a practical experience to servicemen and women in agricultural production using different crops including maize. Recruits in Mgambo JKT are involved in different farming activities so as to cultivate on them a sense of responsibility and the spirit of self-reliance.

Mgambo JKT uses extension services in maize farming from professional officers and civilians employed in the National Service and stationed at the camp. There is a use of tractors for different farming activities such as harrowing and ploughing. There is nonetheless, no use of fertilizers for maize production in Mgambo JKT farms. It has been an inherited practice in Handeni District that maize farmers do not use fertilizers in their farms (URT, 2012).

Land Area Used for Maize Production by Mgambo JKT from 2006 to 2012

Mgambo JKT has expanded her capacity in land area under cultivation in maize production in order to increase total output for maize seeds multiplication. The land area used for maize farming has increased from about 28 hectares in 2006 to about 318 hectares in 2012. Land area used for maize production by Mgambo JKT from year 2006 to year 2012 is shown in Fig. 1.

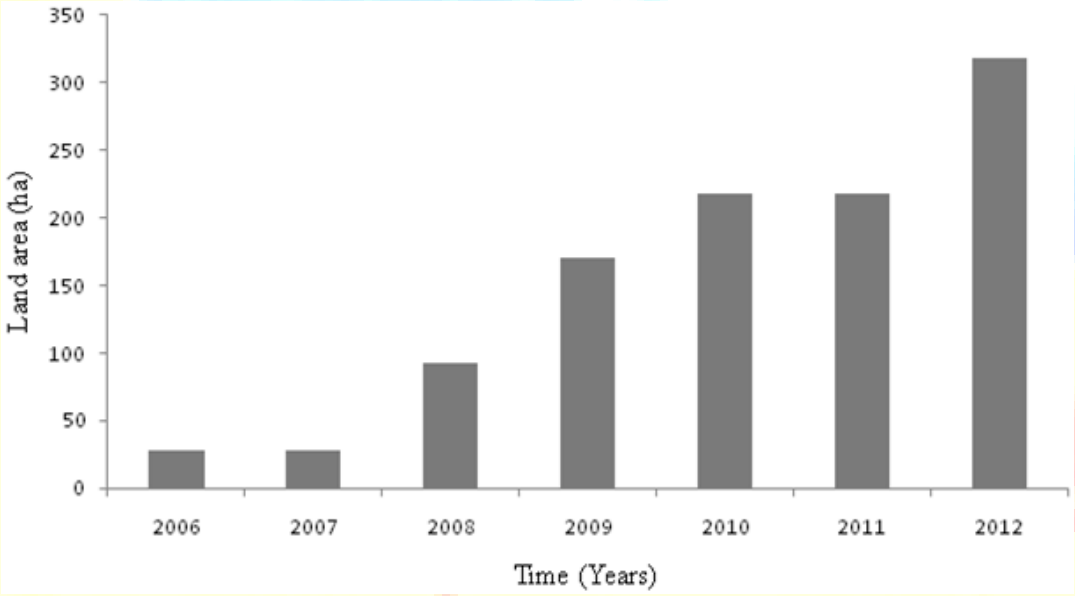

Figure 1: Land area used for maize production by Mgambo JKT

Total Yield in Maize Production by Mgambo JKT from 2006 to 2012

Mgambo JKT has been increasing her capacity in maize production from 48 tonnes in 2006 to about 468 tonnes in 2011 and decreased to about 447 tonnes in 2012 due to rodent outbreak and erratic rainfall. Total maize yield produced by Mgambo JKT is given in Fig. 2. Annual Report 2010/11 by Ministry of Agriculture, Food Security and Cooperatives (MAFC) showed National Service as a stakeholder in seed industry thereby implementing MAFC's objective of enhancing

sustainable agricultural production and productivity. Out of 5678.6 metric tonnes of improved seeds produced in the country for this period, 1 489.1 metric tonnes were produced by National Service and Tanzania Prison Service (URT, 2011b).

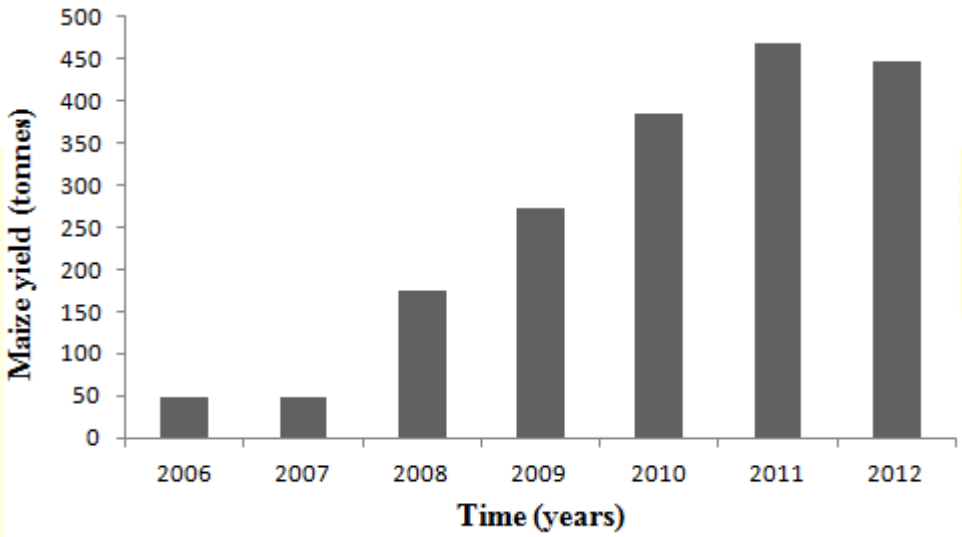

Figure 2: Total maize production by Mgambo JKT

Mean Maize Productivity of Mgambo JKT from 2006 to 2012

Mean maize productivity of Mgambo JKT was 1.7 tonnes per hectare in 2006-2007 seasons and increased to1.9 tonnes per hectare in 2008 season. In 2009 season mean maize productivity dropped to 1.7 tonnes per hectare and increased to 1.8 tonnes per hectare in 2010. In 2011 season maximum mean maize productivity was attained at 2.1 tonnes per hectare and decreased sharply to 1.0 tonnes per hectare in 2012 season. Probably, inadequate rainfall and an outbreak of rodents contributed to the decrease in mean maize productivity of Mgambo JKT in 2012 season despite the measures which were taken to control the rodent outbreak. Rainfall and temperature are critical determinants of crops performance in a rain fed cropping system (Tumbo *et al.*, 2010). Hence erratic weather conditions such as low rainfall have an impact on agriculture performance. Mean maize productivity of Mgambo JKT is shown in Fig. 3.

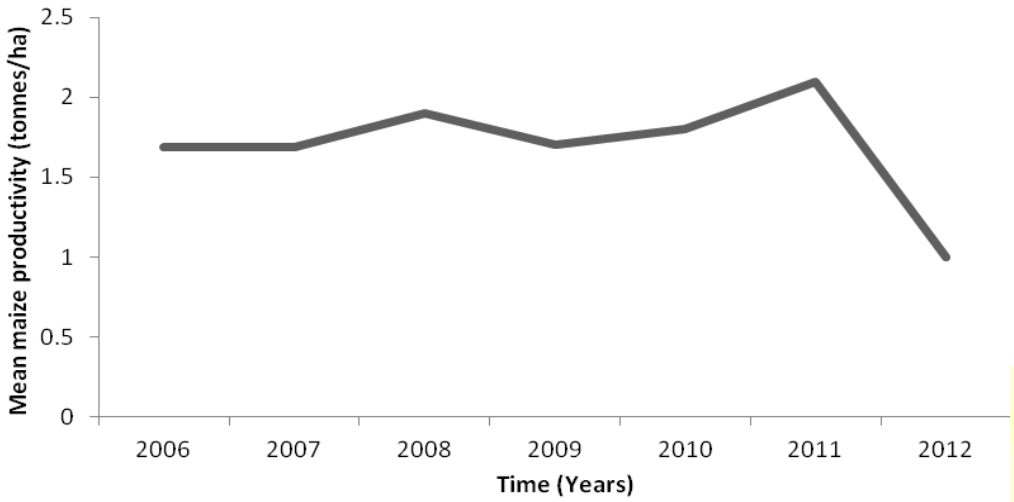

Figure 3: Mean maize productivity of Mgambo JKT

Proportion of Maize Produced by Mgambo JKT on Overall Handeni District Maize Production

In 2011 overall maize production in Handeni District was 68 184 tonnes whereby Mgambo Maize production was 468 tonnes which accounted for 0.7% of total maize production in Handeni District. On the other hand mean maize productivity by Mgambo JKT was 2.1 tonnes per hectare as compared to the district's productivity which was 1.6 tonnes per hectare.

In 2010, the overall maize production in Handeni District was 68 839 tonnes and that of Mgambo JKT was 384 tonnes which was equivalent to 0.6% of total maize production in Handeni District. Maize productivity by Mgambo JKT was 1.8 tonnes per hectare as compared to district productivity which was 1.5 tonnes per hectare.

In the year 2009 overall maize production in Handeni District and Mgambo JKT were 115 578 tonnes and 272 tonnes, respectively. Maize Production by Mgambo JKT was an estimate of 0.2% of the total maize production in Handeni District. Mean maize productivity by Mgambo JKT was 1.7 tonnes per hectare while that of the district was 1.8 tonnes per hectare.

In 2008 overall maize production in Handeni District was 93 283 tonnes. Mgambo JKT Maize production was 174 tonnes which was equivalent to 0.2% of the total maize production in Handeni District. In terms of mean maize productivity, Mgambo JKT had 1.9 tonnes per hectare

as compared to average district's productivity which stood at 1.5 tonnes per hectare. Generally, Mgambo JKT has increased her proportion in overall district production from 0.2% in 2008 to 0.7% in 2011. Although Mgambo JKT has higher maize production per unit area, its contribution in terms of percentage to the total maize production in Handeni District is low. This is due to small land area cultivated under maize production in Mgambo JKT as compared to the total area cultivated under maize production in Handeni District. Mgambo JKT as a large scale producer and a centre for maize seed multiplication has a higher contribution in terms of maize productivity as compared to other producers in Handeni District who are mainly smallholder farmers. High maize productivity by Mgambo JKT makes the camp to be a role model and a source of spillover effects to the surrounding villages in maize production in the Handeni District.

Maize Production by Farmers near and far from Mgambo JKT

Demographic Characteristics of Maize Farmer

Demographic characteristics of maize farmers discussed under this section are age and sex. Age of respondents ranged from 21 to 30 years (17%), 31 to 40 years (23%), 41 to 50 (23%) and about 37% of respondents were above 50 years. The mean age among maize farmers was 46 years. The findings for age from this study are in line with Tanga regional agricultural census report which showed that the mean age of agricultural household heads in the region was 45 years (URT, 2012).

Majority (88%) of maize farmers interviewed were male and few (12%) were female because the study focused on interviewing heads of households. Few households were headed by women. The proportion of agricultural households by sex in the district is 75% for male headed households and 25% for female headed households (URT, 2012).

Land Area Used for Maize Farming between 2010 and 2012

Most (62%) of the respondents cultivated less than 2 hectares in 2012. A Handeni district by-law requires every citizen to cultivate at least one acre (0.4 hectares) for food crops such as maize. Finding from this study is in line with that appearing in Tanga Regional agricultural census report which revealed that the regional average land area utilized for agriculture per household is

1.7 ha. This value is below the national average estimated at 2.0 hectares (URT, 2012). However, the finding is in line with those reported in a study conducted by Tulahi and Hingi (2006) who found that most of farmers in Tanzania are smallholders operating between 0.2 and 2.0 hectares.

In 2012, one third (30%) of maize farmers interviewed cultivated between 2 and 4 hectares, while few farmers (8%) cultivated more than 4 hectares of maize. In 2011 about 58% of respondents cultivated less than 2 hectares, while 27% of them cultivated between 2 and 4 hectares and 15% of them cultivated more than 4 hectares of maize. In 2010, about 57% of maize farmers interviewed cultivated less than 2 hectares, whereas 35% of them cultivated between 2 and 4 hectares, and 8% of them cultivated more than 4 hectares. A trend of land area used for maize farming between 2012 and 2010 shows that about 60% of maize farmers cultivated less than 2 hectares.

Majority (90%) of farmers were unable to cultivate all their land allocated for maize farming. Handeni District is recorded to be the lowest in land utilization in Tanga Region (URT, 2012). In relation to that, most (85%) of the farmers depended on a hand hoe and lacked technology and capital; these factors were the stumbling block for optimization of maize production in their area. The mentioned barriers hindered maize farmers from cultivating large land despite the availability of land suitable for maize farming. Tulahi and Hingi (2006) also found that the major limitations on the size and utilisation of land holdings is the lack of access to modern farming methods and heavy reliance on hand hoe as the main cultivating tool. The authors revealed that majority (70%) of farmers used a hand hoe as the main tool for farming, one fifth (20%) of farmers used animal draft plough and minority (10%) used tractors.

Farming Practices by Maize Farmers in the Study Area

Use of Improved Seeds, Fertilizer, Tractor, Herbicides and Insecticides

In the study area, about one fifth (20%) of respondents near the camp, and one third (30%) of respondents far from the camp, reported using improved seeds in their farms. On the contrary, majority of the maize farmers near (80%) and far from (70%) the camp reported to use local seeds in their farms. The findings from this study are in line with the finding from Tanga

Regional agricultural census report which highlighted that Handeni District is among the districts with the lowest use of improved seeds at about 8%. Majority of farmers use local seeds (URT, 2012).

All maize farmers (100%) near and away the camp did not use fertilizers in their farms. Findings from this study are in agreement with those presented in Tanga Regional agricultural census report which showed that farmers of Handeni district do not use any fertilizer at all (URT, 2012).

No farmers near or away from the camp owned or used tractors for maize farming but instead hand hoe farming was reported to be a dominant practice. By the same token, all of farmers who cultivated maize (100%) near and far from the camp did not use herbicides and insecticides at all. In agreement with findings from this study, Tanga regional agricultural census report also showed that there were no households using herbicides in Handeni District (URT, 2012). Table 1 shows inputs usage by maize farmers in the study area.

Table 1: Inputs usage by maize farmers near and far from Mgambo JKT (n=120)

Input used	Response	Near to the camp (%)	Far from the camp (%)
Seeds usage	Local seeds	80	70
	Improved seeds	20	30
Fertilizers usage	No	100	100
	Yes	0	0
Use of tractors	No	100	100
	Yes	0	0
Herbicides usage	No	100	100
	Yes	0	0
Insecticides usage	No	100	100
	Yes	0	0

Rodent Control: In season 2012 maize farmers near to the camp reported an outbreak of rodents in their farms. About 43% of the respondents employed methods of rodent control such as use of traps and poison while 67% of respondents did not use any methods to control rodents in their farms. On the other hand, maize farmers far from the camp did not report serious outbreak of rodents and all of them (100%) did not use any methods of rodent control. Farmers in Sub-Saharan Africa are faced with risks such pest which in return decrease agricultural productivity among farmers (M'mboyi *et al*., 2010).

Spillover Effects of Mgambo JKT to Maize Farmers of the Surrounding Villages

Mgambo JKT Maize Farms as Demonstration Farms to the Surrounding Villages

Majority (70%) of farmers near the camp viewed Mgambo JKT maize farms as demonstration farms, while one third (30%) of them did not view it that way. Similarly, results from focus group discussions revealed that maize farmers near the camp perceived the presence of Mgambo JKT maize farms in their area as the demonstration from which farmers can observe improved practices such as: the use of improved seeds, planting of two maize seeds instead of three or four maize seeds per hole for increased yield, appropriate spacing, row planting, importance of harrowing, cleanness of farms, observation of planting calendar and learning the sense of hard working. Chi and Yamada (2002) reported that for adoption or diffusion of agricultural technology to occur there are number of factors that influence the extent of adoption of technology. Among such factors is the change agent. Mgambo JKT is an example of change agent to the surrounding farmers as the camp provides demonstration of improved farming practices to the surrounding villages.

Social Interactions between Villagers and Mgambo JKT and Spread of Agricultural Knowledge on Maize Production to Farmers

Ten percent of respondents reported to have acquired agricultural knowledge from the camp as the result of social interaction among villagers and Mgambo JKT workers. Although there is no formal outreach programme from the camp, from focus group discussions, it was learned that some farmers sought advice from agricultural experts of the camp. Some advice mentioned by maize producing farmers included the importance on the use of improved seeds, proper spacing

and row planting. Mansfield (1963) viewed diffusion as a process of imitation wherein contacts with others led to the spread of technology. Reflecting on such a view of diffusion as the result of spillover effects from Mgambo JKT to surrounding villages; social interaction among villagers and Mgambo JKT workers is one of the factors contributing to spread of improved agronomic practices from the camp to surrounding villages.

Imitation of Improved Maize Farming Practices from Mgambo JKT by the Surrounding Villages

Rogers (1983) defined diffusion as the process by which an innovation is communicated through certain channels over time among the members of social system. In this study, the concept of diffusion was used to explain the spread of spillover effects from Mgambo JKT to the surrounding communities. The concept of diffusion as borrowed from Chi and Yamada (2002) was used in terms of understanding how many maize producing farmers know and use improved farming practices imitated from Mgambo JKT. The purpose was to determine how many people in the villages surrounding Mgambo JKT have been affected by spillover effects produced by the camp. Hence it was appropriate to find out the proportion of farmers who have imitated improved maize farming practices from Mgambo JKT as the result of spillover effects.

Fifty percent of maize producing farmers interviewed reported to have imitated maize farming practices such as use of recommended spacing, row planting, harrowing, use of improved seeds, timely planting, farm cleaning, the sense of hard working and planting two maize seeds instead of three or four maize seeds per hole for increased yield. Imitation of improved practices of Mgambo JKT by some maize farmers is the result of spillover effects of Mgambo JKT to the surrounding villages. These findings from questionnaire survey were confirmed by focus group discussions.

On the other hand, half (50%) of respondents reported that they have not imitated any maize farming practices from Mgambo JKT. Focus group discussions showed that farmers were unable to imitate all farming practices from the Mgambo JKT as the opportunity for them was limited to observation. Some focus group discussants identified lack of planned outreach programme and consultation from Mgambo JKT as an obstacle to knowledge transfer and diffusion of improved

farming practices to the farmers near the camp. The structure of a social system can facilitate or impede the diffusion of innovations in the system (Rogers1983).

Lack of planned outreach programme between Mgambo JKT and surrounding villages as the result of social system in the existing civil-military environment impede the rate of imitation of improved maize farming practices. Moreover, consultation is among extension principles that facilitate technological transfer (Mwangi, 1998). Lack of consultation following what farmers observe from Mgambo JKT farms was reported to be an obstacle towards imitation of the demonstrated practices. Table 6 shows the proportion of maize farmers who have imitated farming practices from the Mgambo JKT.

Table 2: Imitation of farming practices from the Mgambo JKT by the surrounding villages (n=60)

Response	Frequency	Percent
No	30	50
Yes	30	50
Total	60	100

Mean Maize Productivity of Farmers near and far from the Camp

A trend of mean maize productivity of farmers near Mgambo JKT increased from 1.7 tonnes per hectare in 2010 to 2.0 tonnes per hectare in 2011 and dropped to 0.4 tonnes per hectare in 2012. Farmers attributed low mean maize productivity in season 2012 to rodent outbreak and inadequate rainfall. The average productivity of farmers near the camp was 1.4 tonnes per hectare for 2010 to 2012 period. This average productivity is slightly higher than the average productivity of 1.3 tonnes per hectare in Sub-Saharan Africa. On the other hand, the average maize productivity for farmers near the camp is far low compared to those of other parts of the world. Average maize productivity on other parts of world ware estimated at 3.8 tonnes per hectare in Brazil, 3.1 tonnes per hectare in Mexico, 2.5 tonnes per hectare in the Philippines and 3.9 tonnes per hectare in Thailand. In addition, most of industrialized countries have the highest average productivity of 8 tonnes per hectare (M'mboyi *et al.*, 2010; Smale *et al.*, 2011).

A trend of mean maize productivity for farmers far from the camp increased from 1.0 tonnes per hectare in 2010 to 1.2 tonnes per hectare in 2011and decreased to 0.6 tonnes per hectare in 2012. Decrease in maize productivity in 2012 was attributed to rodent outbreak and inadequate rainfall. Maize farming in Sub-Saharan Africa is faced with risks such as erratic weather conditions, poor soils, pests, diseases, poor markets facilities and lack rural infrastructure (M'mboyi *et al*., 2010). In relation to that any risk factors such as erratic weather conditions and outbreak of pests result in a sharp decrease in productivity.

Comparison of Mean Maize Productivity between Maize Farmers near the Camp and those far from the Camp: In 2012, an independent t-test on mean maize productivity between maize farmers near and far from Mgambo JKT by assuming equal variances accepted the null hypothesis ($p > 0.05$). The mean maize productivity of maize farmers near Mgambo JKT did not differ significantly from that of maize farmers far from Mgambo JKT. A detailed result of t-test between maize farmers near and far from Mgambo JKT is given in Table 3.

In 2011 an independent t-test assuming equal variances rejected the null hypothesis ($p < 0.001$). Mean maize productivity for farmers near Mgambo JKT differed significantly from that of maize farmers far from Mgambo JKT. Maize farmers near the camp had more mean maize productivity than maize farmers far from the camp and their difference in mean maize productivity was significant. A detailed result of t-test between maize farmers near and far from Mgambo JKT is given in Table 3.

In 2010, an independent t-test assuming equal variances rejected the null hypothesis ($p < 0.001$). Mean maize productivity for farmers near Mgambo JKT differed significantly from that of maize farmers far from Mgambo JKT. Maize farmers near the camp had higher mean maize productivity than maize farmers far from the camp and their difference in mean maize productivity was significant. A detailed result of t-test between maize farmers near and far from Mgambo JKT is presented in Table 3.

Agricultural intervention in an area may result into the spillover effects. A decision taken by National Service to make Mgambo JKT one of the camps specialized on agriculture production

especially in maize seed multiplication resulted into the spillover effects. Imitation of improved agronomic practices of the camp by farmers in the surrounding villages is an illustrative example of spillover effects produced. Hence in order to explain the difference on maize productivity between farmers near and far from Mgambo JKT in 2011 and 2010 seasons as the result of spillover effects, the result of this study was compared to other studies related to diffusion of improved agronomic practices and agricultural technologies.

The study by Morris *et al.* (1999) on adoption and impact of improved maize production technology indicated that majority (60%) of farmers who had intervention on improved maize technologies such as use of improved seeds and row planting had increased productivity. By the same token, spillover effects produced by Mgambo JKT affect maize productivity of nearby villages. Farmers near Mgambo JKT imitated improved agronomic practices such as improved seeds, row planting, recommended spacing, use of improved seeds and timely planting as a result these farmers realised an increase in productivity as compared to farmers far from Mgambo JKT. In relation to that, Muzari *et al.* (2012) have indicated that increased agricultural productivity and technology adoption rates can be achieved through number of factors such as improved agronomic practices and extension linkages. The use of agricultural technologies affects the rate of increase in agricultural output. An increase in technology development enhances the rise in agricultural output among farmers.

On other hand, the season 2012 showed no significant difference in mean maize productivity between farmers near and far from the camp. Rodent outbreak in maize fields caused the sharp decrease in mean maize productivity in the study area hence the lack of impact of spill over effects by Mgambo JKT on maize productivity among nearby farmers as compared to those far from the camp.

Table 3: Independent t-test for mean maize productivity of farmers near and far from Mgambo JKT (2010-2012)

Variable compared	Vicinity of village with respect to the	N	Mean	Std. Deviation	Mean Difference	t-value	p-value

	camp						
Maize productivity (tons/ha) in 2012	Near to the camp	60	0.3970	0.56794	-0.17833	-1.238	0.221
	Far from the camp	60	0.5753	0.54763			
Maize productivity (tons/ha) in 2011	Near to the camp	60	2.0377	1.04621	0.87767	3.919	<0.0001
	Far from the camp	60	1.1600	0.64062			
Maize productivity (tons/ha) in 2010	Near to the camp	60	1.7163	0.82301	0.72733	3.768	<0.0001
	Far from the camp	60	0.9890	0.66364			

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- This study has given an account for contribution of Mgambo JKT on agricultural production by assessing maize production by Mgambo JKT and its spillover effects towards maize production of surrounding communities.

- The study has shown that Mgambo JKT maize production for seed multiplication capacity has increased from 174 tonnes in 2008 to 447 tonnes in 2012. The camp has been expanding its capacity for maize production and seed multiplication through increasing the area under production from 28 hectares in 2006 to 318 hectares in 2012. However, challenges such as dependence on rain-fed agriculture affect productivity capacity of the camp. Dependence on rain-fed agriculture is not a reliable practice for modern commercial maize farming and it provides a risk of low productivity on maize

production and seed multiplication when encountered with a season of minimum rainfall like that experienced in 2012 long rain season in study area.

- The contribution of Mgambo JKT in terms of the proportion in overall Handeni District maize production has increased from 0.2 % in 2008 to 0.7% in 2011.

- The study concludes that spillover effects produced by Mgambo JKT towards surrounding villages have benefited maize farmers near the camp. Some farmers near the camp viewed Mgambo JKT farms as demonstration farms, which in return provide them with an opportunity to imitate improved practices of the camp such as proper spacing, row planting, use of improved seeds, planting two seeds per hole instead of three or four, harrowing, farm cleaning and observation of planting calendar.

- On the other hand, some farmers near Mgambo JKT have not imitated or benefited from the spillover effects produced by the camp. The existing civil-military environment between the camp and surrounding villages has no planned outreach programme to ensure the flow of agricultural related technologies and extension services from the camp towards farmers of surrounding villages. It is limited to individual farmer's observation of Mgambo JKT farms and informal social interaction among villagers and Mgambo JKT workers.

- Comparison of maize productivity between farmers near and far from the Mgambo JKT showed that mean maize productivity (tonnes per hectare) of farmers near Mgambo JKT was higher than that of far from the camp. By holding other factors constant Mgambo JKT was seen to have spillover effects on maize production in surrounding communities.

Recommendations

- In order to increase production efficiency in maize production and maize seed multiplication for commercial purpose, Mgambo JKT should invest highly in increasing area under production as a way to expand production capacity in maize production and seed multiplication.

- In order to have a modern commercial farming, National service camps should seek an alternative of rain-fed agriculture by establishing irrigation schemes. Dependence on rain-fed agriculture is risky and uncertain due to climate change which causes erratic weather conditions.

- In order to become a centre of excellence in agricultural production at district, regional and national levels; National service camps should envision towards increasing agriculture production through increasing use of agricultural related technologies and full utilization of land mandated for agriculture production. This will increase the contribution of National Service in the share of the GDP of agriculture sector at local and national levels; food produced will increase the national food reserve and make National Service as an important stakeholder in ensuring food security in the country. On the other hand, improved seeds produced as the result of seed multiplication in different camps will make National Service an important stakeholder on seed industry in Tanzania.

- In order to ensure the full participation of National Service in agricultural transformation there should be a planned outreach programme for National Service camps towards improving agricultural production of surrounding communities.

- National Service should establish the Agricultural Consultancy Desk (Dawati la Ushauri Kilimo) for consultancy, research and dissemination of agricultural related technologies and information to agricultural producers including rural farmers.

- National Service should cooperate with the Ministry of Agriculture, Food Security and Cooperatives so as to enable District Agricultural and Livestock Development Offices in areas with National Service camps specialized in agricultural production to establish a joint delivery programme of extension services to farmers so as to strengthen the existing system of extension services.

- Conducive civil-military environment between National Service camps and surrounding communities should be maintained and improved in order to strengthen spillover effects flowing from National Service camps to surrounding communities and vice versa.

Areas for further research

- Further studies should be done in order to get a more detailed picture on contribution of National Service in agricultural development as this study was limited to the case of one National Service camp.

- In search for alternatives on change or modernization agents in rural development, more research should be done in order to come up with policy suggestions towards improving the role of National Service on rural agricultural development.

REFERENCES

Chi, T. and Yamada, R. (2002). Factors Affecting Farmers' Adoption of Technologies in Farming System: A Case Study in Omon District. *Omonrice* 10: 94 – 100.

Grigsby, C. (2008). Binding the Nation: National Service in America. *Parameters* 39: 95 – 110.

M'mboyi, F., Mugo, S., Mwimali, M. and Ambani, L. (2010). *Maize Production and Improvement in Sub-Saharan Africa*. African Biotechnology Stakeholders Forum, Nairobi, Kenya. 14pp.

Mnenwa, R. and Maliti, E. (2010). *A Comparative Analysis of Poverty Incidence in Farming Systems in Tanzania*. Special Paper No. 4. REPOA, Dar es Salaam, Tanzania. 27pp.

Morris, M., Tripp, R. and Dankyi, A. (1999). *Adoption and Impact of Improved Maize Production Technology: A Case Study of the Ghana Grains Development Project*.

Economics Program Paper No. 1. International Maize and Wheat Improvement Center, 37pp.

Muzari, W., Gatsi, W. and Muvhunzi, S. (2012). The Impacts of Technology Adoption on Smallholder Agricultural Productivity in Sub-Saharan Africa: A Review. *Journal of Sustainable Development* 5(8): 69 – 77.

Mwangi, J. (1998). The Role of Extension in the Transfer and Adoption of Agricultural Technologies. *Journal of International Agricultural and Extension Education Spring* 5(1): 63 – 68.

Rogers, E. (1983). *Diffusion of innovations.* (Third Edition). Macmillan Publishing Co. Inc., New York. 453pp.

Smale, M., Byerlee, D. and Jayne, T. (2011.) *Maize Revolutions in Sub-Saharan Africa*. Policy Research Working Paper. The World Bank Development Research Group Agriculture and Rural Development Team. USA. 4pp.

Tulahi, C. and Hingi, P. (2006). Agrarian reform and rural development in Tanzania. *Paper Presented at the International Conference on Agrarian Reform and Rural Development*, Porto Alegre, Brazil, 7 – 10 March 2006. 6pp.

Tumbo, S., Mbilinyi, B., Rwehumbiza, F. and Mutabazi, K. (2010). *Economics of Climate Change for Agriculture Sector in Tanzania: Adaption Options and their Cost*. Soil-water Research Management Group, Sokoine University of Agriculture, Morogoro, Tanzania. 63pp.

United Republic of Tanzania (1964). *National Service Act*. Government Printers, Dar es Salaam, Tanzania. 8pp.

United Republic of Tanzania (1975). *National Service Amendment Act.* Government Printers, Dar es Salaam, Tanzania. 5pp.

United Republic of Tanzania (2010). *The Economic Survey 2009*. The Ministry of Finance and Economic Affairs. Kiuta, Dar es salaam, Tanzania. 239pp.

United Republic of Tanzania (2011a). JKT, Miaka Hamsini ya Uhuru wa Tanzania Bara. (National Service, Fifty Years of Independence of Mainland Tanzania). *Vijana Leo Dira ya JKT*. 50pp.

United Republic of Tanzania (2011b). *Annual Report 2010/2011*. Ministry of Agriculture, Food Security and Cooperatives. Dar es Salaam, Tanzania. 119pp.

United Republic of Tanzania 2012). *National Sample Census of Agriculture 2007/2008 Small Holder Agriculture: Regional Report Tanga Region*. National Bureau of Statistics. Dar es Salaam, Tanzania. 55pp.