

Does the Improvement of Productivity of Maize and Rice Reduce Poverty? Comparison Case Study for Tanzania and Togo

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Abstract

Agriculture is the backbone of the economy of most of that provides two thirds of employment and generates over one third of Gross National Income. Maize and rice are dominant cereal crops produced and consumed most by poor people in Sub-Saharan Africa (SSA), as most studies relate poverty and income with no relation to the productivity or environment of the poor people. This study is aiming at determining how the improvement of productivity of major cereal crops (maize and rice) has managed to contribute to the reduction of poverty for Tanzania and Togo. Based on the data from 1961 to 2013, the analysis show that the productivity of both countries for cereal crops has been marginally increasing but the increase in population has caused high demand for food and exuberate poverty for their people. Farmers will continue to face low productivity and marketing risks, which in turn increase the variability in production and income growth of the sector. Special attention is needed to improve the productivity of maize and paddy which are not internationally traded, but consumed by the poor and traded locally. However, due to scarcity of resources cost-sharing could be a necessity and ultimate solution for the poverty reduction for weak economies countries.

Keywords: Productivity, Poverty, Maize, Rice, Tanzania, Togo.

**This paper discussion reflects the views of the authors, not necessarily those of the CAAS (or its member governments).*

1. Introduction

Agriculture is the backbone of the economy of most of SSA, as it provides two thirds of employment and generates over one third of Gross National Income (GNI) and over half of export earnings (DFID, 2004; Schaffnit-Chatterjee, 2014). Most studies conducted in the region show that agriculture productivity is indispensable for poverty reduction and food security. Lyatuu, Nie, & Fang (2015a) analysis of the Tanzanian economy showed that the rate of growth of the nonagricultural sector depended strongly on growth in agriculture, before structural transformation which has made development nonagricultural sector strong. Thus, maize and paddy are the major crops considered as the most important and promising crops to achieve better life and free from poverty. Enormous studies have shown that intensive training on maize and rice cultivation can effectively enhance the adoption of new technologies and boost productivity for both irrigated and rain-fed agriculture in SSA (Nakano, Tanaka, & Otsuka, 2014). Improving maize and rice cultivation technologies are not widely adopted partly because of weak public extension system (World Bank, 2008), but with the possibility that to utilize private sector's resource in extension activities can make a quick difference.

Msuya (2008) argument on his studies on productivity that the scarcity of livelihood options outside agriculture, smallholder farmers face multiple challenges, which in the short to medium term can be unraveled by raising productivity. Low productivity is one of the primary causes of low and unstable value added along the value chains leading to a stagnant rural economy with persistence of poverty. Hence, increasing maize and rice productivity is crucial for improving the livelihoods not only for smallholder farmers but also for the small business.

Various studies have examined the issues of productivity and technical efficiency of farmers for the cereal crops. However, only a handful of them focus on SSA and of these none focus on comparison of the productivity of maize and rice in SSA between East (Tanzania) and West (Togo) (Chauvin, Mulangu, & Porto, 2012; Clarke, 2011; McCullough, 2015). The studies that have analyzed productivity in SSA include Duvel, Chiche and Steyn (2003); Msuya and Ashimogo (2006); Shapiro and Muller (1977); Tchale and Sauer (2007); and Seyoum, Battese, and Fleming (1998) to mention a few. The comparison analysis of Tanzania (East Africa) and Togo (West Africa) is an open way to see the gap and potentiality of market of the maize (considered as food crop) and Rice (considered as cash crop). Most studies focus on other crops, for example, Msuya and Ashimogo (2006) focused on sugarcane production (a cash crop). Shapiro and Muller, (1977) focused on a cotton (cash crop). No studies which we are aware of have done comparison of two countries using two crops.

Recent household budget survey for both countries showed that income poverty (as measured by the poverty line) has been particularly stubborn in rural areas. Whilst the incidence of poverty declined, effect has not been large enough to outweigh population growth (Lyatuu & Nie, 2015). As a result, the actual number of the poor increased by roughly one million persons (Lyatuu, Nie, & Fang, 2015b). However, improvements in

agricultural productivity are important for poverty reduction. Thirtle, Irz, Lin, McKenzie-Hill, & Wiggins (2001) concluded that productivity growth can catalyze a wide range of direct and indirect effects that mediate the pathways to poverty alleviation. This paper takes a close look at the maize and rice sector because they are staple food of choice for the majority of people in SSA, as for many households, they forms the basis of the main family meal.

Given the importance of food crops and income generation to alleviate poverty, especially for maize and rice in economy of the two countries, the comparison analysis will facilitate answering questions on the current status of wealth of farmer and determine the factor(s) that are holding back smallholders from increasing their productivity and reducing poverty. A comparison and understanding of the productivity of the two major cereal crops mentioned above in two countries, will give chance for improvement in either of the country by adopting the policy and farm-specific practices that would provide policy makers information to design programs that can contribute to increasing productivity and reduce poverty among smallholder farmers. Therefore, this study is aiming at determining how the improvement of productivity of maize and rice reduced poverty for both countries. The analysis of maize and rice production systems for the two countries will provide a framework for strategy that will increase production and productivity while eliminating poverty.

The analytical framework, data and empirical model are presented in section three, followed by results and analytical discussion in section four and last session five is conclusions and recommendations.

2.0 Literature Review

2.1. Linkage between Agriculture and Non-Agriculture

While increasing agricultural productivity perhaps remains the single most important determinant of economic growth and poverty reduction, serious doubts are emerging as to whether agricultural productivity can be further increased (DFID, 2004). Development experts need greater understanding of the links between agricultural productivity and poverty (DFID, 2004). They also need to assess just how far they have changed and the extent to which small-scale agriculture can remain a ladder out of poverty for millions of poor people living in rural areas.

The evidence suggests that there are multiple pathways through which increases in agricultural productivity can reduce poverty, including real income changes, employment generation, rural non-farm multiplier effects, and food prices effects (Schneider & Gugerty, 2011). Most researcher link agriculture and poverty reduction through direct and relatively immediate impact of improved agricultural performance on rural incomes, or on the availability of cheaper food for both urban and rural poor, or agriculture's contribution to growth and the generation of economic opportunity in the non-farm sector and or agriculture's fundamental role in stimulating and sustaining economic shift from agricultural to non-agricultural sector.

2.2. Agricultural Productivity, Poverty and Economic Growth

Thirtle et al. (2001) find that the most direct contribution of agricultural (sector) growth to the economic growth and poverty reduction through generating higher incomes for farmers. This is supported by Lyatuu & Nie (2015) on their comparison between income and poverty based on the purchasing power parity of the 2011 for the poverty line \$ 1.25 a day, with the results that; an increase in 1 % percentage of annual gross national income will decrease poverty by 0.041%. Lyatuu & Nie (2015) also did analysis on quintiles whereby increasing in income of the share held by lowest 20% quintile has high decrease in poverty by 1.865% than any other quintiles. Thirtle et al. (2001) in their cross countries analysis findings suggest that agricultural productivity growth has a robust and consistent impact on poverty for all productivity measures, thus, a 1% increase in productivity is associated with a decrease of 0.62% to 1.3% in the percent of the population below the US\$1 per day poverty line.

IFDI (2004) also reported 10% increase in total factor productivity in agriculture would raise the incomes of small-scale farmers by 5% in Asia and a 10% increase in yields resulted in 8.8% increase in household incomes in dry season cultivation and a 4.4 % increase in wet season cultivation for smallholder rice-producing farms in Cambodia.

2.3. Population Growth and Maize Productivity

Since 2000 the share of agriculture to GDP for Tanzania has been declining with average growing rate of only 4% annually, while in Togo agriculture has been increasing with average growing rate of only 4.35 % annually (World Bank, 2015). Despite of favorable climatic conditions for cereals production, the yield for the dominant staple food (maize) recorded in Tanzania at an average of 0.88 tons per hectare (which is very low compare to international yield per hectare), similar scenario happened in Togo of an average of 0.69 tons per hectare. Compared to the population growth rate and maize productivity rate in 1961-2013; average population growth rate was 2.9% while average maize productivity was 1.25% for Tanzania; and for Togo were 2.7% average population growth rate with average maize productivity of 0.98%. This is regrettable due to the fact that a high growth in maize production would reduce poverty, while simultaneously improving food security of poor

households.

2.4. Agriculture Productivity and Population Growth

Comparison between population growth rate and agricultural productivity rate for 1965-2011; growth rate were 2.9% and 2.7% while agricultural productivity was 1.73%% and 0.886% for Tanzania and Togo respectively, in the regime of 1996-2006 the growth rate was 2.58% agricultural productivity recoded minimum for Tanzania while in Togo the productivity has been increasing with increasing population growth rate. For Tanzania is regrettable due to the fact that a high growth in agricultural production would reduce poverty, while simultaneously improving food security of poor households. However, Tanzania had high performance in productivity in the both regions (East and West Africa), while Togo recorded below the regional (East and West Africa) averages (table 1).

Looking at the regional efforts; SSA is barely kept pace with increasing from 40 to 116 million tonnes of cereals in 2002-2007(FAO 2004; DFID 2005). Most of this (probably 80%) originated from expanding the area farmed, whereby the cereals yields increased from 0.8 to 1.2 tonnes per hectare (FAO 2004; DFID 2005). The counterpart Asia the production of cereal tripled from 309 to 962 million tonnes in the same period. The situation for Tanzania and Togo is not different, whereby in the same period the average food crop productivity was 1.7 and 0.886 tonnes per hectare respectively, but ideal and well managed field should be 3.5-4.0 tonnes per hectare(FAO 2004; DFID 2005), this indicate that there is a potential to raise productivity to the acceptable level. However, increasing agricultural productivity cause multiplier effects especially on employment opportunities(Lyatuu et al., 2015a).

The productivity can easily be linked to poverty reduction in a three major ways in a considered area where incidence of poverty is high. First, developing yield by increasing technologies to contribute to the increase in the supply of food (which the poor spend a considerable share of their income). Second, replacing labor demand by developing labor-intensive technologies (e.g. power tillers, threshers, etc.). Third, developing cheap and appropriate technologies for marginal agricultural areas, where poor people can afford it (Keijiro Otsuka, 2000).

Table 1: Comparison of the Agricultural Productivity for Tanzania vs Togo and regions (East and West Africa) in Different Regime

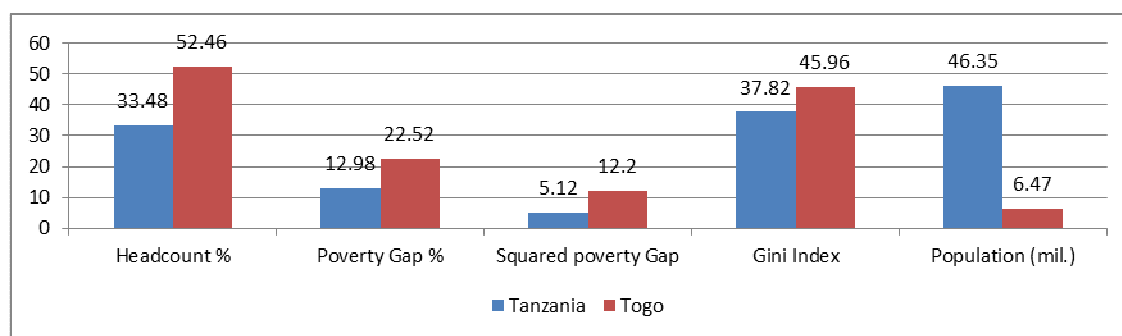
Regime	Tanzania	Togo	East Africa	West Africa
1965-1976	2.035	0.746	2.535	0.809
1975-1986	3.495	0.811	1.03	0.896
1985-1996	2.635	0.812	1.875	1.013
1996-2006	-5.21	1.046	-2.44	1.103
2005-2011	4.01	1.169	3.13	1.246
1965-2011	1.73	0.886	0.96	0.984

Source: World Bank and FAO, author's own calculations

On the other hand, evidence from numerous studies concluded that agricultural and land productivity must rise in order to reduce poverty, latter must rise faster. For instance productivity is generally low in Togolese agriculture caused by limited banking facilities, minimal training, and variable climate and poor soils(Thomas, Jalloh, Tchinguilou, & Nelson, 2009).

2.5. Poverty Incidences

Poverty has fallen rapidly over the past 40 years, but at different rates around the world(DFID, 2005). While poverty is decreasing rapidly in Asia, there is a little poverty decrease in SSA where in some countries number of people living on less than one dollar a day has been increasing, but possibly the way poverty is measured may affect the reported figures. Measure of poverty in SSA using income may be misleading since most people do not keep records and some live in very natural environment where food is not a problem to them. However, historically, rates of poverty reduction have been very closely related to agricultural performance – particularly to the rate of growth of agricultural productivity(DFID, 2005). This is practically correct, since majority of poor people lives in rural areas.



Data Source: World Bank, author's own calculations

Figure 1: Comparison of Poverty Incidence for Tanzania and Togo in current data 2005

To overcome poverty both countries, developed strategy for poverty reduction; in Tanzania Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania (MKUKUTA) or National Strategy for Growth and Reduction of Poverty (NSGRP) was developed while in Togo Complete Strategic Document of Poverty Reduction (DSRPC) was developed. These were aimed at implementing Millennium Development Goal (MDG) of halving the poverty by year 2015. UNDP reported that poverty in Togo affects households practicing agriculture than average people. The report went further narrating households with a woman headed household were slightly less poor than man headed household, which explain why over 62% of the Togolese population lives in rural areas are poor at the rate of 73.4%. Enormous studies narrated the causes of poverty in rural areas in Togo as limited to production inputs including insufficient improved plant material, poor supply of fertilizer and lack of proper storage facilities, poor water control, physical and chemical soil degradation, low labor productivity, land tenure insecurity, insufficient valorization of local products (poor market for farmers produce), low capacity for farmer organizations; limited access to financing, impacts of climate change (PNDAT, 2012 and BCEAO,2012). Generally poverty in Togo is affected by socioeconomic activities while in Tanzania is affected by population increase.

2.6. Maize Production

2.6.1 Tanzania Maize Production

Maize is the main subsistence crop grown on about 41 percent during the masika¹ and 47 percent during vuli season, with the estimate of 65 percent of the households grow maize; these include a large proportion of the poorest households, making maize one of the key markets for poverty reduction efforts. Maize is the 5th agricultural commodity by value of production in the period 2005-2010 accounting for 7.5 percent of total production value(MAFAP, 2013). Tanzania produces mainly white maize which is considered the most important food crop, covering 45 percent of total arable land and generating close to 50 percent of rural cash income, an average of 100 USD per maize producing household in 2008(MAFAP, 2013). In the past two decades Tanzania ranked among the top 25 maize producing countries in the world, dropping out of the list only three times 1986, 1997 and 2003. In 2003 there was nearly 3.5 million hectares devoted to maize, later stabilized to 2.5 million hectares. Production is also more or less stable around 3.5 million tonnes while yields fluctuate between 1 and 1.5 tonnes per hectare down from an average of nearly 2.5 tonnes during the first three years of the 21st Century(MAFAP, 2013).

Mafap (2013) reported 65 percent of approximately 3 million households in Tanzania grow maize, mainly poor smallholder farmers (average 1.2) who rely on traditional methods of cultivation under a rain-fed regime, where approximately 30 percent of all households sold surplus maize in that year. Maize is usually processed into flour used to make porridge or Ugali (stiff porridge), which are consumed by majority especially in school, which is used in a feeding program. Maize marketing is liberalized and the reports by Ministry of Agriculture show that in the early 90s it was estimated that 25 percent of the maize produced was traded, while in 2012 the percentage of marketed share for maize traded increased to 40.

2.6.2. Togo Maize Production

Maize is the most widely cultivated crop as a staple crop with the largest area of cultivation, and grown in all parts of the country, with average yields ranging from 1 to 2 metric tons per hectare, although the cassava is the leading in consumption (Thomas et al., 2009). Production of maize was recorded as 833 000 tons. The areas planted with improved varieties of maize was 1.3% with high yield advantage, but the percentage of the population gained food security was 0.5% in Togo (V.M. Manyong, J.G. Kling, and al., 2000).

¹ Masika is heavy and long rain season, while Vuli is short rain season.

2.7. Marketing of Maize

2.7.1. Tanzania Market of Maize

Marketing arrangements for maize in Tanzania are complex and multi-layered, they involve several layers of traders, given the large number of smallholders selling maize and the need for load consolidation to pay-off the trucks that transport grains. Partly contributed by the release of subsidized maize by the National Food Reserve Authority and excessive marketing costs along the value chain. The government is more interested in keeping maize prices low than in assuring a more remunerative price for farmers. During the years when Tanzania could export maize, the erratic trade policy (with frequent export bans) prevents farmers from getting better prices in regional markets. Moreover, lack of storage capacity makes export maize at low prices and then face high maize domestic prices (MAFAP, 2013). The big reason remains to export restrictions for maize. However, improving the quality of local roads (district and rural), reducing the costs of fuel, and promoting load consolidation is critical for increasing market efficiency and prices for maize producers.

2.7.2. Togo Market of Maize

Markets are well supplied with relatively low prices, with grain production recorded lower than neighbouring countries. The production of grain per capita is 172 Kg in Togo against 268 at Bur-kina and 400 kg in Mali. Maize consumption as a staple food is higher in the Gulf of Guinea countries (Nigeria, Togo, Benin etc.) where by consumption per capita per year reach 70 kg. Future changes in demand for maize is mainly related to the future of the poultry and livestock sectors and not for human consumption due to recently change of eating habit. Thomas et al. (2009) suggest that there will be declining net exports of maize after 2025, even though the world market price for maize is projected to continue to rise, the decline might be due to the increased domestic demand for maize due to population growth, as well as increased demand from the feed industry.

2.8. Rice Production

2.8.1. Tanzania Rice Production

Rice is the second most important food and commercial crop after maize; it is among the major sources of employment, income and food security for farming households. Despite low rice yield levels, the country is the leading producer in Eastern, Central and Southern Africa (Rugumamu, 2014), for southern is second after Madagascar. The rice cultivated area in 2012 was 720,000 hectares, but the average yield per hectare from 2003-2012 is very low (1.8 tons per ha.) (PASS TRUST, 2013). The cultivated area of rice is 681,000 ha, which is 18 % of cultivated land. About 71 % of the rice grown is produced under rain-fed conditions; irrigated land presents 29 % of the total with most of it is in small village practice traditional irrigation systems.

Historically, rice has been categorized under the staple food crop rather than commercial/cash crop. However, in recent years with the rapid growth of cities and towns propelled by rapid population growth, the country has experienced enormous increase in rice demand. With negligible percentages of rice imports, most of rice demanded and consumed by the urban population is sourced from the rural rice producing areas that have stagnating production capacities. For this reason, rice has consequently been transformed into commercial crop. The country is endowed with more than 2 million hectares of lands suitable for rice production, but not all potential area have been used for rice production. Recently reported increase in yield is mainly caused by amount of farm inputs, technology and know-how of producer. Rice production has been increasing from year to year due to priority that has been given by the government. Rice production is mainly done by small and medium size rice farmers (PASS TRUST, 2013).

However the productivity is very low with an average yield of 1-1.5 tons per ha.; Farmers grow a number of traditional varieties, with long maturity and yield that is affected with irregular rainfall pattern and occurrence of pests which contribute to the yield decline (RLDC, 2009). Rice production is completely privatized following the privatization of National Agricultural and Food Corporation (NAFCO) and National Milling Corporation (NMC) except for government operations in the support services like research, input supply and extension services (RLDC, 2009).

2.8.2. Togo Rice Production

The research conducted on rice in West Africa shows that rice is the commodity with the highest potential for growth and the one that could generate the greatest benefits for many countries (Nin-Pratt et al., 2009). Rice pose as one of the major food crop produced and consumed, indicating low potential to produce less than what is needed in Togo. It is surprising that imports nearly half of rice consumed domestically, indicating high demand of rice. The reason for under production is small size plots dedicated for rice production, and it's normally produced manually and mostly dependent on a whimsical rainfall (Hodjo & Acharya, 2015). According to Agricultural Research Institute of Togo (ITRA) only 19% of the rice grown is under irrigation (Hodjo & Acharya, 2015).

The NRDS set the goals of increasing acreage, improving yields and increasing rice production for 2008-2013 and 2013-2018 in order to allow the country to do without importation. The analytical report shows that production needs to increase by 128 percent by 2018. The rice production increased in the last 15 years from

27,000 tons to 52,000 tons of the national demands and there is improvement in yields from 1.2 tons to 2.5 tons / ha for rice that reduces the volume of imports (CTOP2, 2011). National Agricultural Investment and Food Security Programme (PNIASA) initiatives stimulus efforts of increasing production by 2015. However the report from the ministry of agriculture in Togo put initiatives under Agricultural Zones Planned (ZAAP) were development for rice production in 2010 located in Plain Djagblé and Oti.

2.9. Rice Market

The rice is usually sold to local agents and traders, who process, transport and sell the rice into regional centers where the bigger millers operate, and then hauled to large urban areas, where an intricate network of brokers, wholesalers, middlemen, and retailers ensure that the product gets to the final consumer. Overall, there is considerable cash transactions involved in this entire process, making rice an extremely good crop for stimulating economic activity. It is therefore the crop that touches many lives of the poor households and plays an important role in the food security and economic livelihoods, hence poverty reduction. Both countries (Tanzania and Togo) were reported by enormous researchers that rice cultivation is more profitable than other crops in terms of earnings per hectare and daily income. It is reported that, in Togo, rice marketing is ranked third after maize and sorghum and it is interesting to see that there is no single day goes by where rice is not consumed in a household (CTOP,2011).

3.0 Methodology

3.1 Study area

This research study compare effect of productivity of maize and rice on the poverty reduction for East Africa (Tanzania) and West Africa (Togo). Tanzania profile is described as relatively large country located in East Africa with a total area of 945,087 square kilometers (364,900 square miles). The area includes the islands of Mafia, Pemba, and Unguja; the latter 2 form a semi-autonomous region called Zanzibar that is part of an official union with the Republic of Tanzania. The population is approximately 48 million in 2015. In order to contain this growth, the Tanzanian government adopted an official population policy in 1992, the policy, which came into effect in 1995, emphasizes measures designed to increase the general standard of living of the population. It is argued that one of the major causes of population growth is poverty, as families are obliged to have large families in order to increase familial income. On the other hand Togo is located in West African in the coastline on the Gulf of Guinea and extends inland with the land size of 21,925 square meters (56,785 km²) and the population of 6.6 million (World-Bank, 2012). The government of Togo has not yet elaborated an official population policy although it has concerns which adopted family planning as a strategy to reduce poverty while promoting socio and economic development.

3.2 Source of data

The data of this study were culled from World Bank database and FAOSTAT from 1961 to 2013 for Tanzania and Togo.

3.3 Data Analysis and model specification

The study used descriptive analyses such as graphs, tables to describe distribution of production of selected cereal crops from 1961 to 2013. The research used the time series to determine the relation between the yield and poverty incidence. The data were analyzed to find linear relationship between Y_i (dependent variables) and X_i (explanatory variables), in the model expressed below:

$$Y_i = \alpha + \beta X_i + \varepsilon_i \dots\dots\dots(1)$$

Where Y_i is productivity or production, X_i is the production factors such as fertilizers consumption, agricultural machinery, tractors etc., β is the regression coefficients, α is the constant term, i^{th} is the term for the country and ε_i is error terms,

When the combination of the Poverty, GDP and Productivity of cereals were put together, the following equation was used

$$P_i = \alpha Y_i + \beta M_i + \gamma R_i + \varepsilon_i \dots\dots\dots(2)$$

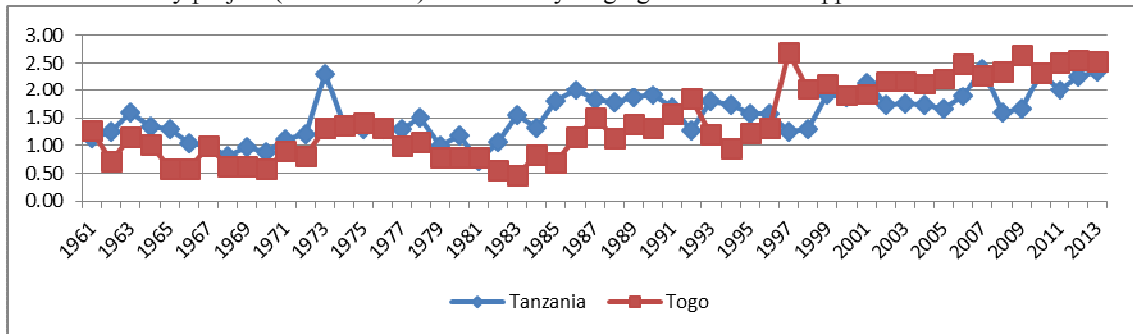
Where P is Poverty Head Count for the country, Y is the annual economic growth, M is the maize productivity, R is the Rice productivity, ε is the error term, while i^{th} term is the country (Tanzania or Togo) with observation of the constant term.

² Togo Coordination of Farmers' Organisations and Agricultural Producers.

4.0 Results and Discussion

Following the pattern of rice productivity for Tanzania and Togo, the rate fluctuate so much but generally there is a little increase in productivity since 1961 for both countries (figure 2). For Tanzania the productivity was high in 1974 but drop again until 1985 which stabilize a bit probably attributed by the development of irrigation scheme.

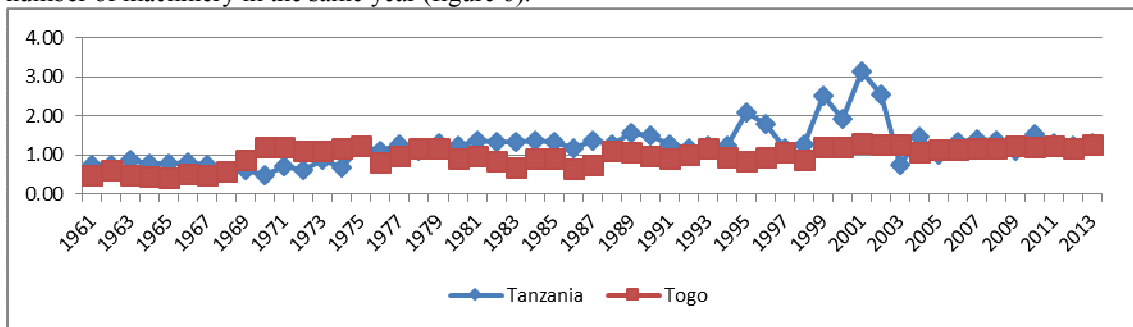
In Togo the productivity drop slightly since 1961 but stabilize after gaining the pick in 1998 until now (figure 2). Low productivity from 1961 to 1973 caused by poor technology which improved in 1977 attributed by the number of machinery used by cotton farmers in the country during that period of time (figure 2&4). Up and down fluctuation in 1978 and 1984, 1985 to 1993 and between 1994 and 1995 are caused by the same reason of poor mechanization system (figure 2&6). However improvement of productivity from 2000 was attributed by fertilizer subsidy project ("PNIASSA") introduce by Togo government to support farmers.



Data Source: World Bank, author's own calculations

Figure 2: Productivity patterns of rice (tons/Ha) for Tanzania and Togo

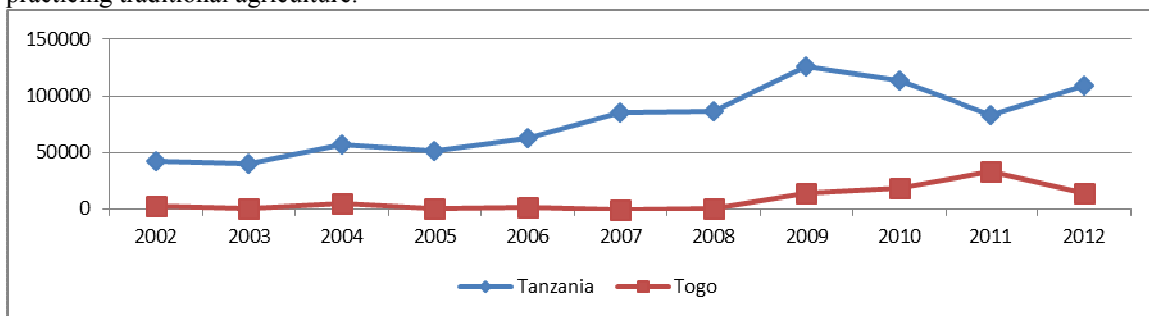
The situation is different in Tanzania where by it is surprising to see that the introduction of subsidy voucher input in 2008 did not increase productivity (figure 4), which was explained by Lyatuu et al., (2015b) on their paper that most strategies or plans developed in Tanzania were for political reason rather than targeting need for the farmer. The other reason for increase in productivity for Tanzania in 1985 is due to increase in number of machinery in the same year (figure 6).



Data Source: World Bank, author's own calculations

Figure 3: Productivity pattern of Maize (tons/Ha) for Tanzania and Togo

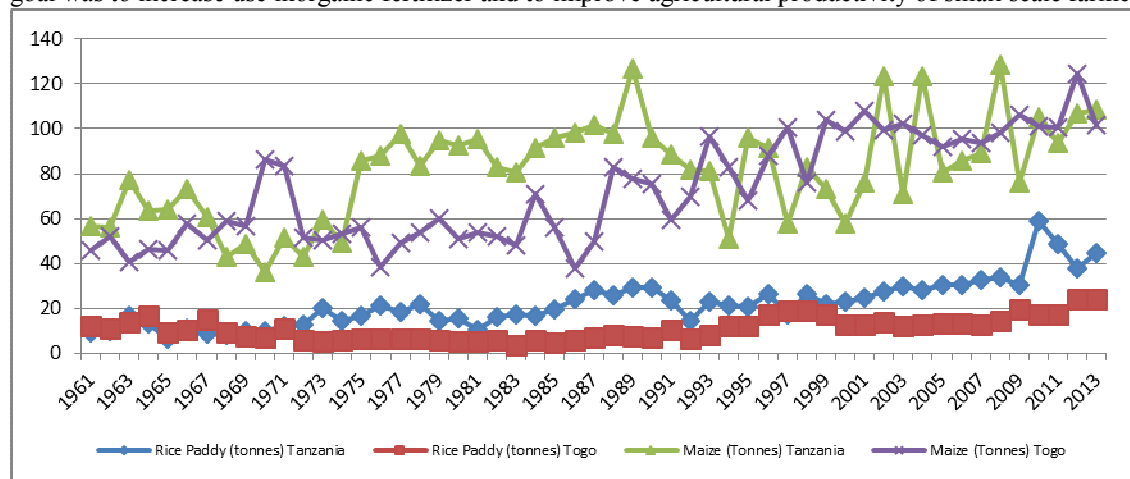
Maize productivity shows to have similar pattern for both countries (Togo and Tanzania) with almost constant rate since 1961 to 2013 (figure 3). This might be contributed by the fact that the farming system is almost similar for both countries, of which farmers are operating in a small plots for subsistence (range 0.2-2ha per family). Low productivity is partly attributed by low adoption of new agricultural technology, but always practicing traditional agriculture.



Data Source: World Bank, author's own calculations

Figure 4: Inorganic fertilizer consumption comparison between Tanzania and Togo

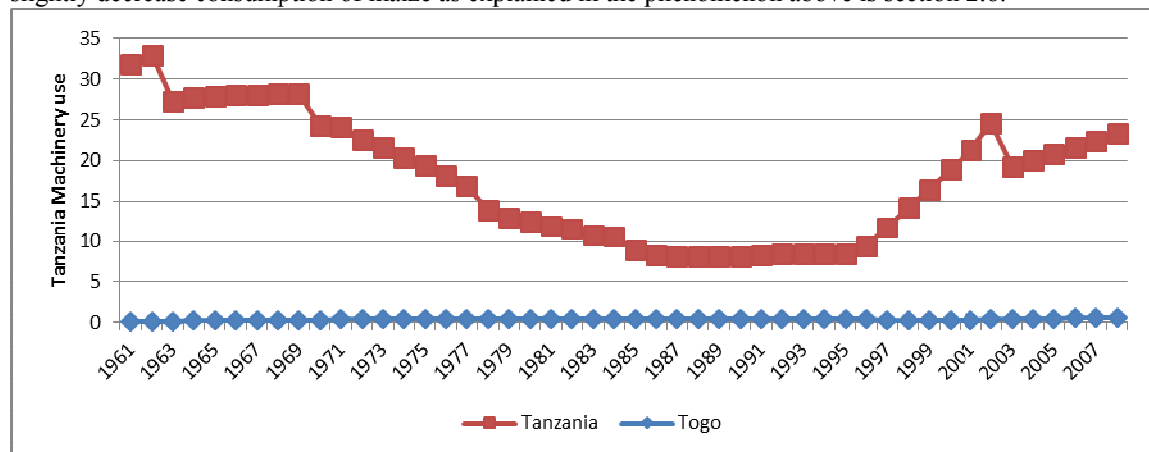
Application of the inorganic fertilizer seems to start recently (data were only available from 1990s) for both countries with the increasing of application for Tanzania while Togo experience constant trend (figure 4). High increase in Tanzania started in 2007 is attributed by introduction of subsidy voucher input system programme, which targeted farmer to increase use of fertilizer. The drop of application of fertilizer was experienced in 2011 where the programme of subsidy ended, but regaining again in the following year 2012 (figure 4). The low level of inorganic fertilizer consumption is associated with poor financial access in Togo but the increase of fertilizer use in 2009 attributed by Lomé's engagement in the waste management policy that gave permission to ENPRO NGOs to establish a project sorting composting (K. Edem KOLEDJZI, 2011). The project goal was to increase use inorganic fertilizer and to improve agricultural productivity of small scale farmers.



Data Source: World Bank, author's own calculations.

Figure 5: Comparison of Production per capita for maize and rice for Tanzania and Togo

Comparing per capita production, rice shows to grow in Tanzania but Togo maintains constant approximation since 1961 (figure 5). For the Maize there is high fluctuation for both countries with slightly increase since 1990 (figure 5), indicating population increase, the demand for the cereals increase, hence decrease in one year made the other year having deficit that increase production to compensate for the last year. However, rice tends to have slight increase attributed by tradition of the two countries increasing consumption of rice and slightly decrease consumption of maize as explained in the phenomenon above is section 2.8.



Data Source: World Bank, author's own calculations

Figure 6: Comparison of the Agricultural machinery, tractors per 100 sq. km of arable land for Tanzania and Togo.

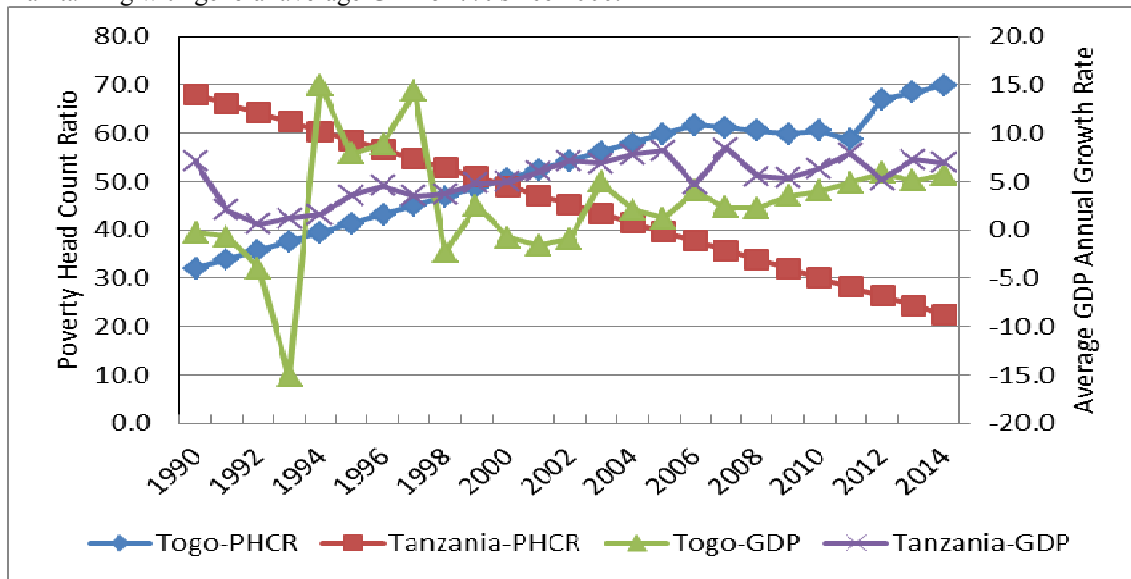
On application of agricultural machinery, Tanzania has decreasing on use of machinery since 1961 until 1995 which had steep increase in use of machinery and the decrease again in 2001 before increasing in the following year. In Togo machinery use has been increasing year to year until 1989 which experience fast decrease until 2000 which gain increasing momentum but with very small rate. Although Tanzania has high number of machinery per 100 sq. km than Togo, but still has larger area for agricultural productivity that require mechanization than Togo, so per hector consumption Tanzania have high adoption use of machinery than Togo.

According to IFAD, in 1990s, Togo suffered through a socio-political crisis, an economic regression and a decrease in public and international aid. As a result, an estimated 62 per cent of the population currently lives below the poverty line. The country's challenge now is to create the conditions for economic growth – and

the Government of Togo believes that the best way to achieve lasting growth is through increased production and productivity in the agriculture sector.

4.2. Comparison between Cereal Production, Economic Growth and Poverty

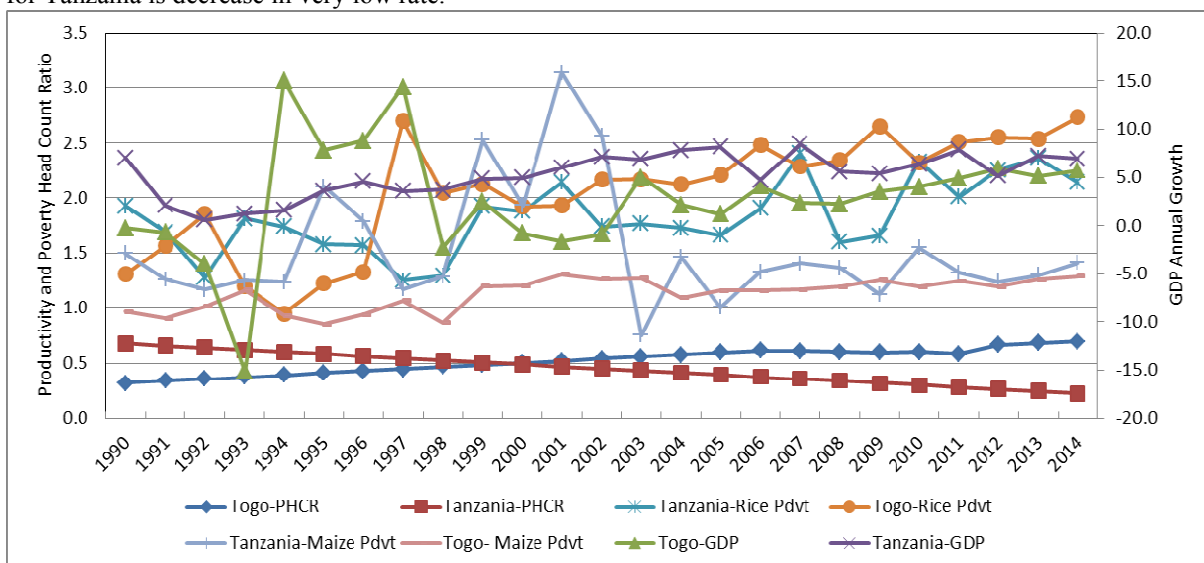
Poverty incidence since 1990 seem to decrease in Tanzania while in Togo it increases based on the increase in population. Figure 7 shows the poverty trend (poverty head count ratio) and GDP having almost the same trend for Togo while in Tanzania poverty (PHCR) is decreasing while GDP is increasing. Going to the specificity, GDP for Togo drop to the minimum (-15%) but increasing the following year to the maximum (15%) and continue to fluctuates up and down until 2006 when it started growing again. GDP trend for Tanzania was minimum in 1992 (0.6%) and started to pick up since then and hit maximum in 2005 (8.5%) but later maintaining with general average GDP of 7% since 2000.



Data Source: World Bank, author's own calculations

Figure 7: comparison of poverty head count ratio and GDP growth trends for both countries

When GDP, Cereal production and poverty trend are compared since 1990 to 2014 (figure 8); the following were observed; the trend of productivity of maize in Tanzania fluctuate but generally since 1990 it shows slightly decreasing trend while in Togo the trend is maintained at almost constant in the same period of time. Rice trend show to increase in both countries, that's create mixed feeling that demand for rice has increase more than demand for maize but it has not managed to reduce poverty since PHCR for Togo is increasing while for Tanzania is decrease in very low rate.



Data Source: World Bank, author's own calculations

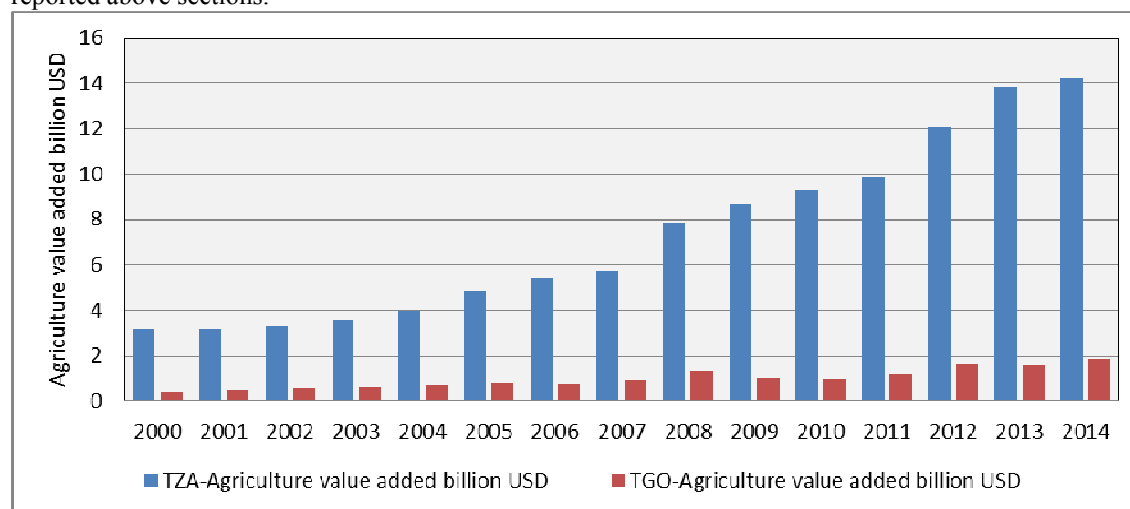
Figure 8: Comparison of poverty head count ratio, productivity of rice & maize and GDP growth trends for both countries

The regression analysis run for poverty against other parameters for both countries as it is shown on table 2, all parameters show significance except for Togo GDP which did not show any significant to the poverty reduction. The quick explanation is that Togo economy is most based on few rich people as explained by very high inequality (64%).

Table 2: Results of Regression analysis for Both Countries

Parameter	R	R ²	Unstandardized Coef.		Standardized Coef.	t	Significant
			Beta	Std. Error	Beta		
TZAGDP	0.948	0.898	-0.03923	0.017159	-0.47255	-2.28624	0.0322*
TZA-Rice Pdvt			0.21849	0.072454	0.85511	3.01557	0.0064*
TZA-Maize Pdvt			0.15756	0.058142	0.53868	2.71003	0.0128*
TGO GDP	0.992	0.984	0.00213	0.002592	0.02578	0.82402	0.4188
TGO Rice Pdvt			0.11226	0.039446	0.44398	2.84593	0.0094*
TGO Maize Pdvt			0.25078	0.070607	0.54073	3.55173	0.0018*

The increase in the inequality (GINI coefficient) suppresses the marginal increase in the rice production reported above sections.



Data Source: World Bank, author's own calculations

Figure 9: The comparison of the Agriculture value added for both countries in Billion USD

The value of Agriculture Added for both countries increases although in Tanzania is increasing at increased rate while Togo is fluctuating with slightly increase. This indicates that in Tanzania the poverty can be removed through improvement of productivity while Togo productivity is good for reducing inequality while decreasing poverty, but only if there is an increase on the prices of maize and rice produce.

5.0 Conclusion and Recommendations

Majority of both rural Togolese and Tanzanian farmers continue to face low productivity and low production and marketing risks, which in turn increase the variability in production and income growth of the sector. This paper is recommending that special attention is needed to be given to improving the productivity of cereal crops especially maize and rice which are not internationally traded, but consumed by the poor and traded locally. However, due to scarcity of resources cost-sharing could be a necessity and ultimately the solution for the poverty reduction and boosting productivities since both countries have weak economies and high costs of capital.

Togo needs good and comprehensive policies to reduce poverty to be implemented based on the available information. Land tenure system should be reformed to allow convenient and easiness of land access. Attract and equip youth who are showing interest in agriculture investment. In a nutshell, both countries need new strategy that can modernize farming system and equip rural dwellers where agriculture is practiced and also minimize requirements (collateral) and lower interest rates for agricultural financial loan from financial providers.

Recommendations for Future Research

This study recommends future research to focus on poverty reduction strategies by breaking the poverty vicious cycle within the household, community, country and SSA region at large. The analysis should be beyond agriculture, but also based on cross-country analysis.

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