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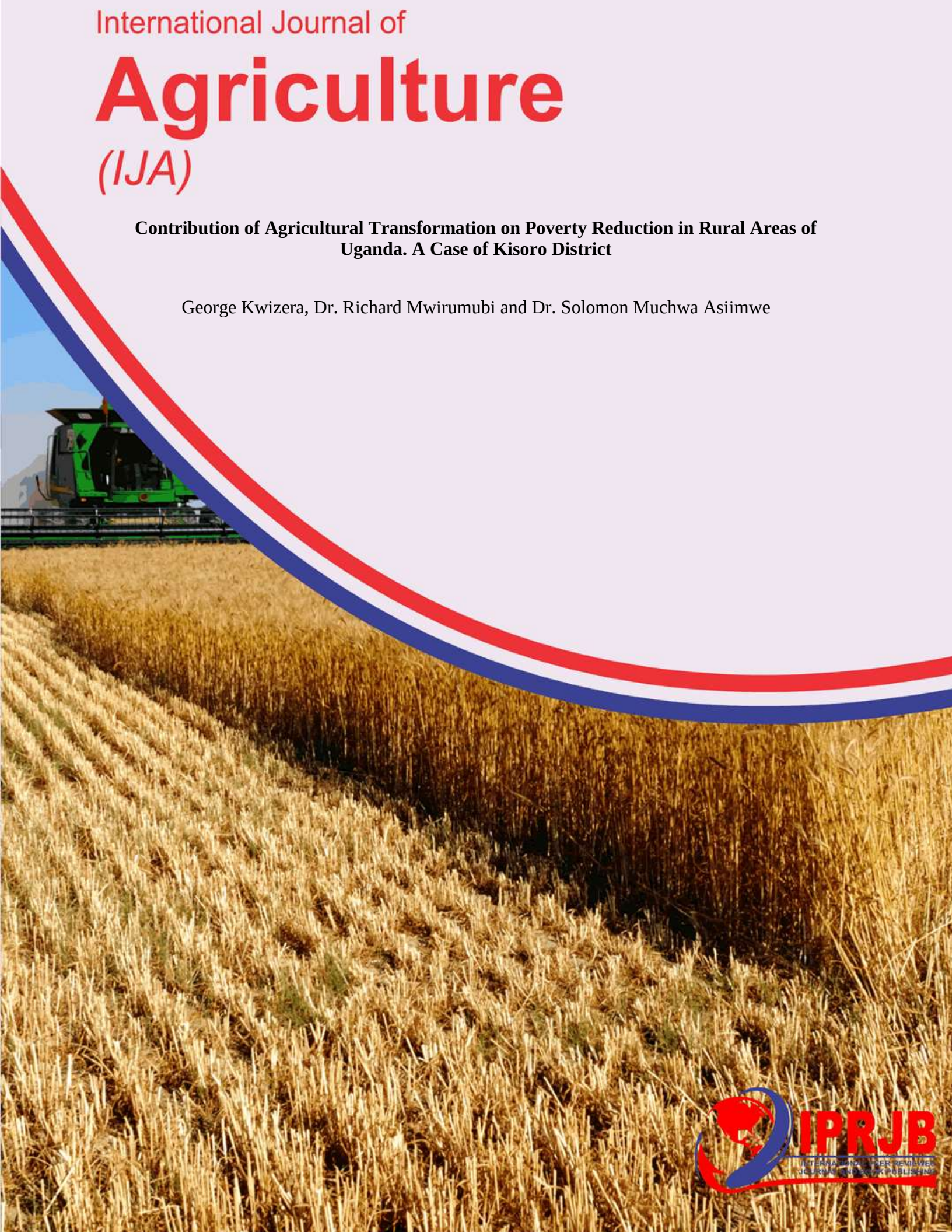

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Contribution of Agricultural Transformation on Poverty Reduction in Rural Areas of Uganda. A Case of Kisoro District

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Abstract

Purpose: In Uganda, poverty in rural areas had remained a challenge as depicted by 31 percent of rural population below poverty line as of financial year 2016/2017 (UBOS, 2018) having risen from 22.8 percent in financial year 2012/2013 (MoFPED, 2014). In Kisoro district, poverty was high as manifested by low household access to electricity (7.6%), piped water (33.7 %), high illiteracy levels, food insecurity, poor housing conditions where 84.6% of households lived in semi- permanent dwelling units (UBOS, 2017). The study was to examine how agricultural transformation could contribute to poverty reduction in rural areas of Uganda with a case of Kisoro district. The study objectives were: to establish how farming practices could contribute rural poverty reduction in Kisoro district; to explore the effect of agro-processing on rural poverty reduction in Kisoro district; to find out how marketing of agricultural produce and products could ensure rural poverty reduction in Kisoro district and to establish the relationship between agricultural transformation policies and rural poverty reduction in Kisoro district.

Methodology: The study was undertaken in Kisoro district where 391 participants were respondents from sample of 400 a representation of 97.8 % response rate. The respondents were constituted of agricultural farmers and industrialists, business entrepreneurs, district technical staff, religious, political and opinion leaders. Both quantitative and qualitative approaches were used in the study with a cross- sectional survey design applied. The methods used in data collection methods were: survey, interviews, observations and review of both primary and secondary documents; the tools used included self-administered questionnaires, interview guide, interview schedule, observation plan, observation checklist, a camera and a recorder.

Findings: The study findings established that Farming practices could significantly ensure rural poverty reduction in Kisoro district.The findings established that there was a positive and significant relationship between farming practices and rural poverty reduction ($r = 0.253$, $p< 0.05$). Agro-processing had a significant effect on rural poverty reduction in Kisoro district with a positive and significant relationship ($r = 0.351$, $p< 0.05$) with also a positive and significant influence on poverty reduction ($\beta= 0.170$, $p = 0.001$). This result demonstrated that improvements in agro- processing were followed by improvements in poverty reduction. Marketing of agricultural produce and products could significantly ensure rural poverty reduction in Kisoro district ($r = 0.246$, $p< 0.05$), though with a negative as well as insignificant influence on poverty reduction ($\beta = -0.018$, $p = 0.751$The findings established that there was a positive and significant relationship between agricultural transformation policies and rural poverty reduction ($r= 0.329$, $p<0.05$) with a positive and significant influence on poverty reduction ($\beta = 0.141$, $p = 0.002$). On the whole, the findings established that agricultural transformation explained 15 % of the contribution on rural poverty reduction (adjusted R square = 0.150). This implied that a unit improvement towards agricultural transformation had an effect in reducing rural poverty by up to 15%. reduction. The study concluded that strategies that aimed at reducing rural poverty needed to embrace agro- processing and government policies since they had the highest coefficients in poverty reduction and also to adopt new approaches and technologies for enhanced growth.

Unique Contribution to Theory, Practice and Policy: The study recommended that; agricultural transformation through innovative practices like agro- ecological zoning, farm automation, artificial intelligence, soil and land management practices, irrigation, research and development, precision agriculture, diffusion, high- pay off inputs, infrastructural development, enterprise development loans, community agricultural stores, village agricultural teams, enabling fiscal policies could be sustainably promoted for enhanced agricultural productivity, marketing and incomes.

Keywords: *Agricultural Transformation, Rural Poverty Reduction, Innovation*

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INTRODUCTION

This study examined how agricultural transformation could contribute to poverty reduction in rural areas of Uganda taking Kisoro district as a case study. Poverty in rural areas of Uganda and particularly in Kisoro district was high across years basing on people who were living below poverty line basing on $ 1.90 per day as set in 2015 (World Bank, 2016) though previously had other set standards. The trend of poverty was summarized as hereunder.

Table 1: A Summarized Tabulated Trend Analysis of Poverty in Uganda for Selected Financial Years (FY) between 2002-2017

		FY2002/ 2003	FY2005/ 2006	FY2009/ 2010	FY2012/ 2013	FY2016/ 2017
Population Size		25.3 Million	27.2 Million	30.7 Million	34.1 Million	37.7 Million
Number of people below poverty line		9.8 Million	8.4 Million	7.5 Million	6.7 Million	8 Million
Percentage of people below poverty line	National	38.8%	31.1%	24.5%	19.7%	21.4%
	Rural	42.7%	34.2%	27.2%	22.8%	31%
	Urban	14.4%	13.7%	9.1%	9.3%	15%

Source: Uganda National Household Surveys, 2016/2017 (UBOS, 2018) and 2019/2020 (UBOS, 2018), Poverty Status Report of 2014 (Mo FPED, 2014).

Multi-dimensionally, rural poverty in Kisoro district was also high as characterized by poor nutrition with only 9.7 percent of households being food secure (Spring, 2016) and 11.4 percent of households with members of 5 years and above consuming less than two meals a day (UBOS, 2018). More so, there was also limited access of households in Kisoro district to electricity (7.6%) and piped water (33.7%) and where 86.2 % of the households derived their livelihood from subsistence farming that had low income returns (UBOS, 2018).

The high poverty levels necessitated government intervening with socio economic growth strategies like electricity supply, road infrastructure, ICT connectivity, (National Planning Authority, 2015) but all yielding less impact. The study therefore, established how agricultural transformation, could economically transform Uganda in general and Kisoro district in particular thereby leading to poverty reduction in rural areas.

Conceptually, agricultural sector was also identified for this study because close to 80 percent of Ugandan households depended on it for their livelihoods whereas in rural areas, about 90 percent of rural households were involved in it as compared to 46 percent of their counter parts in urban areas and yet about 69 percent of the households in Uganda derived their livelihood from subsistence farming (UBOS, 2016). However, though agricultural sector was predominant and would transform the livelihoods of the households, the incidence of poverty in rural areas was high at 31 percent of persons below poverty line as compared to 15 percent of their counter parts in Urban areas as stated under the Uganda National Household Survey, 2016/2017 (UBOS, 2018). The implication of the high rural poverty situation amidst majority of the households deriving their

livelihoods from agriculture meant that the agricultural sector needed to be transformed from its subsistence nature for it to be competitive and income generating.

Subsistence farming remained a causal factor for poverty in Uganda. In the Uganda National Household Survey 2016/2017 report (UBOS, 2018), households headed by subsistence farmers had their percentage of the poor rise from 20.3 percent to 38.2 percent with subsistence crop farmers, poverty rising from 23 percent of them to 36 percent between financial years 2012/2013 and 2016/2017 respectively thus portraying a worsening poverty situation. Subsistence farming/agriculture was associated with low level of economic development as it was characterized of being of small scale, peasantry, low productivity of land and labour, low income and low technology (Abele and Frohberg, eds. 2003).

Kisoro district was identified for the study because of being a rural district, dominated by agriculture with 86.2 percent of the households deriving their livelihood from subsistence farming (UBOS, 2017). The main crops grown in the district were; sorghum, millet, maize, bananas, sweet potatoes, beans, peas, irish potatoes vegetables(carrots, beet root, green pepper, cauliflowers, cabbages, onions, collards, spinach and tomatoes) and fruits grown on a very small scale like avocadoes, apples, fruit tomato and passion fruits while some domestic animals kept by households for income were goats, sheep, pigs, cattle with a few farmers having dairy cows and chicken as reared birds (Kisoro District Local Government, 2015). However, as other crops were being grown, animals and chicken kept, the main cash crops grown though on a very small scale were; onions in Kanaba and Nyarusiza Sub counties; tea in Kirundo, Nyabwishenya, Busanza, Nyarubuye, and Nyakabande Sub Counties, while Arabic coffee was introduced with all geared at commercializing the highly dominated subsistence agricultural sector.

UBOS, established that poverty in Kisoro district was high with about 11 percent of its households getting one meal a day for adults and 27 percent of the households depending on earned income leaving the rest vulnerable to poverty shocks. The Gross Domestic Product (GDP) per capita values in Kisoro district was also established to be at US $ 192 which was far below the national GDP per capita average value of US $ 580 (Rafa, Moyer, Wang and Sutton, 2017). In comparison with other districts especially in western region were Kisoro district belongs, Kisoro district still had lower GDP per capita for instance, GDP per capita for Kanungu district was at US $ 210, Rukungiri district at US$ 224, Kabale district at US $ 347, Ntungamo district at US $ 463, among other rural districts while Urban districts like Kampala had a GDP per capita of US $ 2,655, Wakiso district at US $ 3, 250 (Rafa, *et, al.*, 2017). The low GDP per capita of people in Kisoro district in comparison with other districts meant that they had a low standard of living which was a characteristic of poverty and efforts were needed to reverse the situation. The analysis of poverty and agricultural sector in Uganda and Kisoro district is demonstrated in the Table 2.

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Table 2: Analysis of Poverty and Agricultural Sector in Uganda and Kisoro District for Years 2012- 2014

Uganda			**Kisoro District**
		2012-2014	**2014**
Total Population Size	General/ Overall	34.6 million	281,705
	Rural	27.2 million	256,251
	Urban	7.4 million	25,454
Number of people below poverty line		6.7 Million	Deprivation (Non- monetary) measures were used in poverty assessment i.e. illiteracy levels, housing conditions, energy sources for lighting, nutrition status, extra (UBOS, 2017).
Percentage of people below poverty line	General	19.7%	
	Rural	22.8%	
	Urban	9.3%	
Percentage of households by residence	Rural	75%	90.96%
	Urban	25%	9.03%
Percentage of households involved in Agriculture	Agriculture (General)	79.7%	92.7% (General)
	Rural	90.4%	
	Urban	46.4%	
	Subsistence farming as a source of livelihood (General)	69.4%	86.2% (General)
	Subsistence farming as a source of livelihood (Rural)	82%	

Source: Poverty Status Report, 2014 (MoFPED, 2014), National Population and Housing Census-2014 Main Report (UBOS, 2016), National Population and Housing Census, 2014 Area-Specific Profile Report Kisoro (UBOS, 2017), Kisoro District Development Plan, 2010 (National Planning Authority, 2010).

Owing to the above poverty trends and poor agricultural sector, transforming agriculture which was the largest employing sector, could reverse the negative trend of rural poverty. In this study therefore, the linkages between agricultural transformation through agricultural farming practices i.e. agronomic management practices, soil fertility management practices, post-harvest handling methods; processing, marketing and government policies were established to ascertain their impact on poverty reduction (PR) in rural areas.

Problem Statement

Rural poverty in Uganda had been a challenge over a period of years. The level of rural poverty was established using Multi- dimensional poverty index and income poverty measure. Multi-dimensionally, a person was construed to be poor if he/she encountered 30 percent deprivation of non-income factors like water, education, electricity, water, among others (Sharma and Kumar,

2011). In Uganda, there were household deprivations in rural areas with less than 1 percent and 17 percent utilizing electricity for cooking and lighting respectively, with only 86.6 percent accessing safe water especially during wet season contrary to 75.4 percent during dry season (National Service Delivery Survey, 2015). The Uganda's income poverty determined by poverty line threshold of US $ 1.90 per day (World Bank, 2015), was in rural areas established at 31 percent of people below poverty line as opposed to the urban poor who were at 15 percent in financial year 2016/2017 (UBOS, 2018), having risen from 22.8 percent for rural population and 9.3 percent for urban population in financial year 2012/2013 (MoFPED, 2014).

In Kisoro district, household deprivation was prevalent as reflected with 33.7 percent and 7.6 percent of them accessing piped water and electricity respectively while 11.4 percent of them had members of 5 years of age and above consuming less than 2 meals a day (UBOS, 2016). Worse still, only 9.7 percent of households were food secure (Spring, 2016). All the said poverty indicators were a concern and unless reversed, the people's economic situation could deteriorate.

This study attributed the persistent poverty in rural areas of Uganda to a large agricultural subsistence sector from where 86.2 percent of households in Kisoro district derived their livelihood with less income (UBOS, 2016). This study therefore examined how agricultural transformation could contribute to poverty reduction in rural areas of Uganda, with a focus on Kisoro district. Emphasis was on better agricultural farming practices, processing, marketing of produce and enabling policies for improved incomes and rural poverty reduction.

Purpose of the Study

To examine how agricultural transformation could contribute to poverty reduction with a view of developing strategies and recommendation for poverty reduction in rural areas of Uganda taking Kisoro district as a case study.

Study Objectives

1. To establish how farming practices could contribute to rural poverty reduction in Kisoro district
2. To explore the effect of agro- processing on rural poverty reduction in Kisoro district
3. To find out how marketing of agricultural produce and products could ensure rural poverty reduction in Kisoro district
4. To establish the relationship between agricultural transformation policies and rural poverty reduction in Kisoro district.

Scope of the Study

Geographical Scope

The study covered Kisoro district in South Western Uganda as a rural district in Uganda. Characteristically, Kisoro district has a relatively low temperature with a mean annual maximum temperature of 23^{o}-25^{o}C in the dry spell and mean annual minimum temperature of 10 ^{o}- 12.5 ^{o} C and its relative humidity is between 80% and 90% and falls to about 40% during the dry season. Two rainy seasons are experienced in a year in the district with over 1500 mm of rainfall registered in the period between March and May/June and also between August and October. The rest of the

periods/ seasons have an annual rainfall of between 1000 and 1250 mm. The rainfall experienced is conducive for crop growing during the two crop seasons hence making crop production possible throughout the year coupled with fertile soils and arable wetlands. The good climatic conditions for agricultural sector growth are attributed to water bodies and forests. There are four lakes being Mutanda, Kayumbu, Mulehe, Chahafi and also a crater lake on Mt. Muhabura and also a number of both surface and underground water sources though with some areas having no water sources especially in the southern part. The swamps and open water bodies covered 9.8 Km^2 and 28.3 Km^2 (National Biomass Study, 1995) of the district area respectively. Kisoro district also has two National parks being Mgahinga Gorilla National Park and Bwindi Impenetrable National Park and also Echuya Game reserve. Administratively, Kisoro district at the time of study was comprised of both Bufumbira and Bukimbiri counties, one municipality, 13 Sub-counties and 8 Town Councils.

Time Scope

The period under study was 15 years being between 2002 and 2017 where a longitudinal analysis of the trends of poverty in general and rural poverty in particular was made in cognizance of several policies and interventions that were put in place to mitigate it over that period.

Content Scope

The study covered the agricultural transformation and its contribution to poverty reduction in rural areas of Kisoro district. Agricultural transformation through better agricultural farming practices, processing and marketing of agricultural outputs and enabling government policies towards poverty reduction; and its relationship with poverty reduction through access to social services, food security and entrepreneurial development in rural areas were examined in this study.

LITERATURE REVIEW

This study reviewed the literature on the contribution of agricultural transformation in rural poverty reduction. It established the existing literature on agricultural transformation and poverty which it used to develop the study. The literature reviewed covered, review of related literature and conceptual framework as explained hereunder:-

Review of Related Literature

Rural Poverty

Poverty has been perceived differently by different scholars and theorists. The World Bank (2016) defined poverty as lack or insufficiency of money to meet the basic goods and services necessary for survival with dignity. Such could include food, clothing and shelter and which Mwabu, (2016) and (Tilak, 2002) referred to as income poverty which is measured in monetary terms using the poverty line index. The World Bank, however indicated that in addition to an insufficiency of money to buy basic necessities, that poverty also took the form of deprivation in other areas of the wellbeing of the people like health, education, housing and water. By implication, poverty takes two forms being, income poverty and non- income poverty. United States department of Agriculture's Economic Research Service, refer individuals as being poor when their income can not purchase the basic needs being food, clothing, shelter and other essential goods and services (Weisenbeck, 2007).

The definition of poverty is however, relative in its meaning depending on its application. Poverty can be categorized as either absolute or relative (Ravallion, Chen and Sangraula, 2008), where absolute poverty is regarded as a state of severe deprivation of basic human needs which include food, shelter, clothing, medical care, education, sanitation, water and information. World Bank indicated that absolute poverty is more or less similar to extreme poverty on the account that people under extreme poverty, survive on less than the determined poverty line threshold of US $1.90 dollars per day and further indicated that moderate poverty where a person lived on less than US $ 2 or US $ 5 dollars per day differed across societies or countries depending on their economic standards. Relative poverty has been viewed by World Bank as socially defined and dependent on the social context. By implication, one can be relatively poor without necessarily being in a state of absolute poverty. Relative poverty could be used to measure income inequality within the societies and it is an index of income inequality (Ravallion, *et al.*, 2008).

Income poverty is only measured by the poverty line threshold. However, a Multi- Dimensional Poverty Index (MPI) developed under Oxford Poverty and Human Development Initiative (Sharma and Kumar, 2011) is used for poverty measurement taking into account non- income factors like education, health and access to other services that enhance on the standard of living. Using Multi- Dimensional Poverty Index, a person is defined as poor, if for all the weighted indicators, he/ she experiences 30 percent deprivation as indicated by Sharma and Kumar. By implication, Multi- dimensional poverty index provides a higher threshold for the acceptable minimum standards of living, whereby a section of people who could be construed to be living above poverty line, would be taken as multi- dimensionally poor if the measurement parameters/ indicators were considered (UNDP, 2014 cited in Poverty Status Report of MoFPED, 2014). Countries that have used this poverty measure include India as indicated by Sharma and Kumar and also used in Uganda by UNDP in poverty assessments as in Uganda Poverty Status Report (2014).

Since the study is on rural poverty, a number of definitions had been advanced on the concept of ‘rural’. According to the U.S Census Bureau, Rural was defined as a territory and population outside urbanized areas and urban clusters (Miller, 2010). Anriquez and Stamoulis (2007), defined the term rural on geopolitical methodology as any area excluded from an urban area and where an urban area was state, region or district capitals/ centres. Rural poverty therefore denoted poverty found in rural areas with its factors of rural society, rural economy and rural political systems that gave rise to poverty found there.

World Bank notably estimated about 1.29 billion people as poor living below poverty line in 2008, with 75 percent of them living in rural areas (World Bank, 2016). World Bank stated that Sub-Saharan Africa had the world’s highest incidence rate of absolute poverty of 47 percent in 2008, which was corroborated by Mwabu (2016), when he indicated that African region had highest number of poor people in the world with majority of them living in rural areas.

Agricultural Transformation and Rural Poverty Reduction

Agricultural Transformation is defined as a process by which an agri-food system transforms over time from being subsistence-oriented and farm-centered into one that is more commercialized, productive and off-farm centered (Timmer, 1988). Agricultural growth has proved to provide

positive results in poverty reduction. Countries like China (Wang, 2013), Vietnam, Brazil, (Janvry and Sadoulet, 2009), Bangladesh, India, Pakistan and Nepal (Anik, Rahman and Sarkar, 2017), registered economic growth and poverty reduction from agriculture due to land and labour productivity with their associated increased yields and income multiplier effect. Countries that could not have registered formidable successes from agriculture like in Africa, could also have the potential to earn big from it because agricultural productivity growth had a significant effect on reducing poverty (Mwabu, 2016).

Agricultural sector had in the studies undertaken also been established to lead to substantial growth in economies. In providing additional evidence to rural poverty reduction, Janvry and Sadoulet (2009), associated it to agricultural labour productivity and growth in yields and viewed land and labour productivity as being crucial in enhancing agricultural incomes thereby reducing poverty. Godoy and Dewbre (2010), and Mwabu (2016), established that growth in agricultural incomes substantially affected the aggregate growth especially in rural population where agriculture was a predominant sector.

Wang (2013) and Anik, *et al.* (2017), viewed agriculture as an economic development factor in providing rural employment, earnings from produce, food and nutritional security arising from increased agricultural productivity. Anriquez and Stamoulis (2007), also observed the importance of agriculture in rural growth and economic prosperity through its forward and backward linkages.

The successes of the agricultural sector in poverty reduction was evidenced by the Asian green (agricultural) revolution which noticeably accelerated poverty reduction due to increased farmers' incomes and employment (DFID, 2004). DFID, viewed the contribution of the agricultural sector in poverty reduction especially in developing economies as being provision of rural employment for wages, and farmer earnings from sales.

Timmer (2017), also associated food security to poverty reduction. In his study findings, Timmer established that real incomes especially of vulnerable households increased with availability and access to food thus enabling them to have some disposable incomes to attain other basic necessities of life. Timmer, further noted that food security which was attained when there was increased yield per unit area of land and labour productivity, culminated into reduced food prices that had a positive effect on poverty reduction. Agricultural sector's role in poverty reduction had also been traced in its linkage with other non- farm/agricultural sectors which supplied it with inputs or provided market for its products thus leading growth (Janvry and Sadoulet, 2009).

However, it is notable that the rural communities that have greatly suffered from the impact of poverty majorly rely on agricultural sector since, of the world's extremely poor people estimated at 1.2 billion, 75 percent of them live in rural areas and where agriculture is largest sector upon which they depend (Anriquez and Stamoulis, 2007). Anriquez and Stamoulis argued that promotion of the rural agricultural sector, would create employment opportunities to the rural people thereby enhancing their incomes through wages, reduce income inequality and rural urban migration thus leading to their economic progress. Janvry and Sadoulet (2009), noted that rural households could get out of poverty when their incomes increased from sales of agricultural products within their subsistence or market oriented economy, and when their subsistence economy was transformed into a market economy for better earnings.

Owing to the significant contribution of the agricultural sector in poverty reduction and stimulation of economic growth, some economies came up with policy recommendations geared at promoting the sector. Some countries steered their agricultural sector through strategic planning and allocation of resources to it like Nepal and Pakistan which set targets in their plans 2013/2014 - 2015/2017 and 2013-2018 respectively for their agricultural growth through technological improvements for maximized outputs while countries like Bangladesh were investing in research and development for technological advancements and innovations to enhance their land and labour productivity in agricultural sector (Anik, *et al.*, 2017). This was the same notion shared by Mwabu (2016), who found out that adoption of improved farm technologies, farmers' innovation, and regulation of food prices could yield positive results and Timmer (2017), argued that agricultural transformation could be attained through commodity innovations and adoption of biological and chemical technologies which would raise agricultural productivity thereby reducing poverty.

Other scholars and authors had due to the vital importance of agriculture in aggregate household poverty reduction and economic growth of economies made recommendations for a transformed agricultural sector that met the desired transformational standards. Hossain (2004), Anriquez and Stamoulis (2007), Sharma and Karma (2011), Madhur and Rashid (2016), indicated that policy reforms and investments in infrastructure could transform rural communities to development. Rural infrastructure development was found to be a significant factor for promoting agricultural growth and suggested that electricity supply, health facilities, schools, safe water supply and availing means of transport and communication like roads to link farmers to markets needed to be made available to realize high labour productivity and resultant high yields, incomes and poverty reduction. DFID (2004), also recommended that infrastructure development, price incentives to farmers, access to international markets, commercial production and production of staple food crops for food security could lead to poverty reduction.

In a bid to transform agricultural sector, Godoy and Dewbre (2010), emphasized economies to formulate enabling agricultural trade policies, increase budgetary expenditures on agriculture and promote agricultural research. Wang (2013) and Anik, *et al.* (2017), also corroborated on poverty reduction strategy through agricultural transformation interventions by encouraging investment in education, research and development for production of high quality products. They however added that land reforms and redistribution, marketization, price increases of agricultural products and technological progress could also steer agricultural sector to progress.

More other studies established that rural growth from poverty was found to have an amalgam of strategies. Hossain (2004), Sharma and Kumar (2011), Madhur and Rashid (2016), found out that agricultural transformation on one hand and strengthening rural non-farm sector, investment in human capital (like in education) and infrastructure could drive people out of poverty.

Winters and Chiodi (2008), indicated that people with higher education levels especially secondary level and beyond had opportunities of higher income returns accruing from their wages especially with convenient location. However, they argued that as people attained higher levels of education, they tended to participate in activities within the agricultural sector in rural/ remote areas that attracted higher wages thus emphasizing the issue of location being a determinant for employment and wage of educated people. By implication, urban areas attracted non- farm labourers from the rural set up due to the non- farm activities there as compared to rural areas. Like others, Anik, *et*

al. (2017), indicated that investment in education had the potential to boost agricultural growth besides other benefits that would accrue from it and recommended investments in primary, technical and tertiary education with the latter being for technological breakthrough.

Other strategies of transforming agricultural sector were advanced. Sharma and Kumar (2011), indicated that land reforms, subsidies to agricultural sector, promoting rural urban linkages like infrastructural networks linking both urban and rural areas for marketability of rural agricultural outputs, opening up regional markets for domestic agricultural products and promoting the rural non- agricultural sector that had linkages with the agricultural sector could transform the agricultural sector thereby reducing rural poverty. However, like Hossain, (2004), Sharma and Kumar noted that access to rural credit to finance farming activities was paramount especially to rural communities who had challenges of poor financial base.

In a nutshell, focus for rural growth in this study was on agriculture for it was pro- poor with remarkable contribution on poverty reduction. Datt and Ravallion (1996) in DFID (2004), noted that India witnessed reduced rural poverty due to a transformed agricultural sector. The same notion was emphasized by Warr (2001) in DFID, when he indicated that, some South East Asia countries had a significant reduction in poverty due to agricultural sector growth.

However, contrary to the expected significant contribution of the agricultural sector in poverty reduction, DFID (2004), indicated that despite large interventions in promoting agricultural sector especially in the developing world, poverty remained prevalent except with some few successes with Asian tigers since the green revolution. It envisaged a rapid economic growth trend derived from economic diversification to non- farm ventures like manufacturing and services.

Cognizant of the above studies, it was also evident that agricultural sector transformation had a positive relationship with poverty reduction in a sense that with agricultural sector transformation, poverty reduction increased especially in the rural societies where majority of people were employed by agricultural sector.

By the scholars like Anriquez and Stamoulis (2007), Janvry and Sadoulet (2009), Godoy and Dewbre (2010), Mwabu (2016), Wang (2013), Anik, *et al.* (2017), recognizing the importance of agricultural sector in reducing poverty for sustainable rural growth, governments ought to focus on development of agriculture for enhanced labour and land productivity thereby increasing yields, disposable incomes and subsequently reducing rural poverty.

Conceptual Framework

The relationship between agricultural transformation as the independent variable (IV) and rural poverty reduction as the dependent variable (DV) was established in this study. Agricultural transformation was studied to find out how it could contribute to poverty reduction in rural areas. Rural poverty reduction as a dependent variable was also studied to establish strategies that could sustainably reduce it. The relationships of the studied variables were conceptualized in Figure 1.

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Conceptual Framework

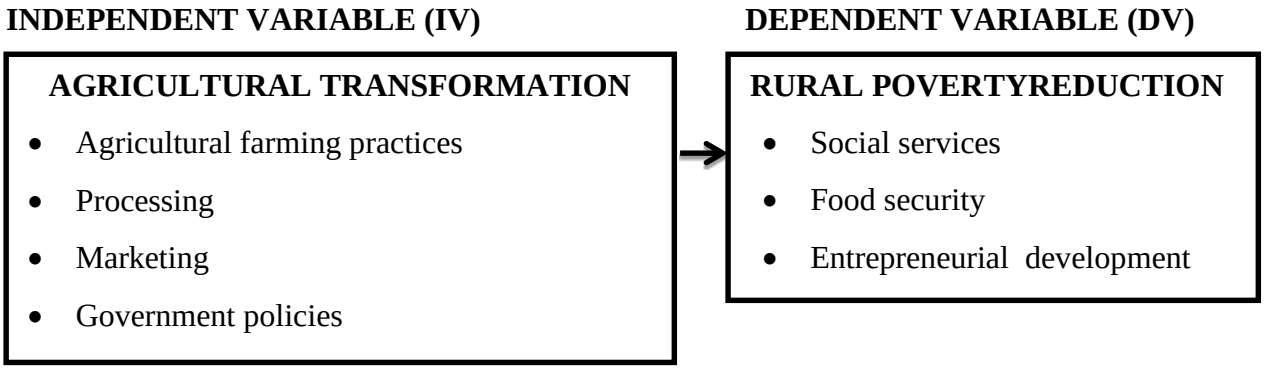

Figure 1: *Conceptual Framework*

Source: Adapted and Modified from FAO, 2011

The Figure 1 above illustrates that rural poverty reduction through having potential to access social services (health, education, safe water, electricity, housing); food security, and entrepreneurial development could be realised through agricultural transformation.

Agricultural transformation would be through better agricultural farming practices like application of modern agronomic management practices, soil fertility management practices, post-harvest handling methods; processing of agricultural produce for value addition, Marketing systems including use of Communication and Technology (ICT) in agriculture and creation of market linkages, and agri-business practices. Government policies were studied to determine their effect on agricultural transformation with its influence on rural poverty reduction. Agricultural transformation strategies would be geared at increasing productivity, marketability and associated financial returns from produce thereby leading to growth and rural poverty reduction.

METHODOLOGY

The study methodology comprised the methods, approaches and instruments that were used in carrying out the study. The methodology encompassed the research philosophy, research design, population of study, sample size and selection strategies, data sources, data collection methods, instruments and tools, validity and reliability tests, data processing and analysis.

Research Philosophy

Pragmatism as the philosophical paradigm was followed in this study because it integrates more than one research approach and strategies within the same study and promotes use of mixed methods in research which entail use of multiple research methods, techniques and procedures in obtaining satisfactory results that was appropriate for this study.

Research Design

Cross-sectional survey under descriptive research design was used to examine the contribution of agricultural transformation towards poverty reduction in rural areas of Uganda. The design was chosen because the results from the sampled population could be extrapolated to the entire population of study (Amin, 2005) and thus it was convenient due to the large population

(Backstrom and Hursh, 1963 in Ahuja, 2007). This study used mixed method of both qualitative and quantitative approaches while stablishing relationships between the studied variables.

Study Population

The study population in Kisoro district was two hundred eighty one thousand, seven hundred five (281,705) participants from whom a sample of 400 (four hundred) respondents were selected. The sample categories included: - 134 agricultural farmers, 133 Kisoro district local government employees and 133 participants from other categories including business entrepreneurs, political, religious, and other selected opinion leaders and agricultural industrialists. The population of Kisoro district as per the National Population and Housing Census 2014, (UBOS, 2017) was selected as the study population.

Sample Size

A sample size of four hundred (400) respondents was selected from study population of two hundred eighty one thousand, seven hundred five (281,705) participants, and determined using Slovin formulae (1960).

According to Slovin, sample size is calculated by :- $n = \frac{N}{1+N(e)^2}$,

Where the sample size is represented by **- n,**

Study population is represented by **- N**, and

The confidence level is 95% with 0.05 as a standard error of measurement represented by - **e**

Therefore, the calculation of the sample size was given by:

$$n = \frac{281,705}{1+ 281,705\ (0.05)^2}$$

Sample size = 399.43 which was = 400.

The researcher rounded the sample size to 400 respondents since the people couldn't be in halves.

Sampling Techniques

Both probability and non- probability sampling techniques were used in this study.

Probability Sampling

Probability sampling technique used was stratified sampling because it enabled respondents to have equal chances of participating in the sample besides taking into account the homogeneity and heterogeneity of the study population for elimination of bias (Amin, 2005). This technique was applied on organized farmer groups at Sub County levels where one group was randomly selected from each selected sub county.

Non- probability Sampling Technique

It included purposive sampling and snowball sampling (SRS) (Table 3.1). Purposive sampling

International Journal of Agriculture
ISSN 2520-4629X (Online)
Vol.8, Issue 2, No. 3. PP. 22 - 53, 2023

www.iprjb.org

technique was applied on selection of Kisoro district local government employees who included heads of departments, Agricultural, fisheries and veterinary officials, Sub County Chiefs/ Town Clerks, Community Development Officers and selected heads of institutions and opinion leaders. Snowball Sampling technique was applied on individual farmers with identification of some few farmers using agricultural officials, who in turn assisted in identifying other study farmer respondents.

The category of respondents, population sample size and their sampling techniques with reasons for choice of sampling techniques were tabulated in the below table 3.

Table 3. Population, Sample Size and Sampling Techniques

Category of respondents	Target Population	Sampled Population	Technique for Population sampling from the target population	Sample Size	Percentage (%)	Sampled categories	Number of sampled respondents	Sampling Technique of sample size	Choice of Sampling Technique
Agricultural farmers	259,745 persons from 57,721 households	241,488 Majorly those in subsistence crop farming from 53,664 households	Category of farmers majorly in subsistence farming as per National Population and housing census (2014)	134	33.5 %	Individual farmers	67	Snow ball	Involved in farming
						Farmer groups	67 respondents from 7 farmer groups	Stratified	Youths, women and mixed groups of rural farmers.
Others: 1.Employment Incomers Others 2.Business entrepreneurs 1. Cottage industrialists 2. Property income owners 3. Family support/ 4. Remittances from abroad 5. Other occupations including opinion leaders	21,960	2,253 (Civil servants)	Civil servants on Kisoro district local government payroll (2018)	133	33.25%	Agricultural, Fisheries and Veterinary officials, Sub County Chiefs/ Town Clerks, Parish Chiefs, Community Development Officers, District heads of department, and selected heads of institutions	133	Purposive	Agricultural Officials and Technical officials with human capital potentials and involved in rural poverty eradication
		230	Random	133	33.25%	Selected district political leaders, heads of religious institutions and NGOs, and Business entrepreneurs, agricultural industrialists, members on committees, boards and commissions	133	Purposive	Involved in rural poverty eradication efforts
TOTAL	**281,705**	**243,971**		**400**	**100%**		**400**		

Source: National Population and Housing Census, 2014; Area Specific Profile Report Kisoro (UBOS, 2017), Kisoro District Five- Year Development Plan (2015/2016- 2019/2020).

Data Sources

There were two sources of data being primary data where data was collected from the sampled respondents being farmer groups, individual farmers, business entrepreneurs, Kisoro district local government employees and selected opinion leaders through use of interviews, self-administered questionnaires, focused group discussions and observation. There was also secondary data which was generated from the reviewed literature materials, books or documents.

Data Collection Methods, Instruments and Tools

There was triangulation of both qualitative and quantitative methods in data collection

Data Collection Methods

Quantitatively, survey method through use of self-administered questionnaires on Kisoro district local government employees, agricultural industrialists and business entrepreneurs; and qualitatively through use of interviews on individual farmers and opinion leaders; focus group discussions with selected farmer groups; participant observation of the life style and agricultural activities of farmers selected as respondents to ascertain their status and agricultural practices and documentary review of both primary and secondary documents were undertaken.

Data Collection Instruments

Data collection instruments used in data collection were self – administered questionnaires with both structured and unstructured questions; interview schedule with date and time of interview, interview guide and focus group discussion guide both with open- ended questions, observation checklist and observation plan. The instruments used enabled this study to obtain the required data to meet specific objectives of this study (Mugenda and Mugenda, 2003).

Data Collection Tools

The Recorder (Stereo IC Recorder - Sony: ICD- PX470) was used to record the responses of the respondents during the interview which complemented the views recorded by the researcher during interviews for clarity on responses thereby enriching the study findings. *A Camera (Telephone) w*as also used *w*ith the permission of the respondents, where snap shots were taken on observable items/ areas that were vital for the study like agricultural field activities and farming tools.

Validity and Reliability Tests

Validity

In establishing the appropriateness of the instrument, the research instruments were tested through pre-testing them on 10 potential respondents before final study to establish any areas for improvement through consideration of comments and suggestions and correction of deficiencies.

To establish the validity of the instruments, the researcher used face validity, content validity and construct validity. Face validity was used basing on the face of the questionnaire as an instrument on the variables being measured, from where answers from the respondents were obtained. Content validity was also used to establish the extent to which the content of the research instrument corresponded to the theoretical concepts of agricultural practices and rural poverty it intended to

measure. The content validity of the instrument was measured using the Content Validity Index (CVI) to establish the Coefficient whose formula was:-

Content Validity Index (CVI) = Number of declared valid/ relevant items

Total number of items

It is worth to note that for the instrument to be taken as valid, its coefficient of validity index should be 0.7 or above (Amin, 2005). Since the number of declared valid items were 25 against the total number of items being 25 then the coefficient of validity index was 1 which implied that the instrument was absolutely valid.

Construct validity was also used to ascertain whether the tool was corresponded with the theoretically derived hypotheses among the research variables, the study intended to measure.

Reliability

Reliability of the research instruments to ascertain their consistency on the respondents' answers was tested using test- retest reliability/ stability reliability and internal consistency using Cronbach's coefficient alpha test (`Amin, 2005). Test- retest reliability was used to provided evidence that the scores obtained in the first test were the same when the respondents were retested using the same test. On the other hand, internal consistency using Cronbach's coefficient alpha test was also used in testing the reliability of the study instrument. SPSS software was used to measure the internal consistency reliability of the instrument for a correlation coefficient which was established to be 0.866 higher than 0.5 implying that the instrument was reliable and with each of the individual dimension having a coefficient alpha of more than 0.8 as shown hereunder.

Table 4: Reliability coefficient

Dimension	Reliability coefficient/ Cronbach's Alpha	Number of items
Agricultural transformation and rural poverty reduction	0.883	12
Rural poverty reduction	0.849	13
Overall/ Total	**0.866**	**25**

Data Processing and Analysis

The collected data was processed and analysed both quantitatively and qualitatively to obtain meaningful information about the research problem.

Data Processing

Quantitatively, data collected through self-administered questionnaires was processed by editing and checking for correctness in numbers received from the field, errors (if any) removed, questionnaires coded and entered into a statistical package for social sciences (SPSS) computer software and further screened for correctness and consistency for the purpose analysis.

The qualitative data obtained from interviews and focused group discussions, was processed manually through data checking, editing, hand coding on a coding sheet according to the themes developed using the objectives of the study (Amin, 2005 and Mugenda and Mugenda, 2003).

Data Analysis

Statistical Package for the Social Sciences (SPSS) was used to analyze quantitative data in determining the relationships between agricultural transformation aspects and rural poverty. Descriptive analysis was used in data analysis to determine the status of the studied variables. Pearson product- moment correlation coefficient was also used to determine the strength of association and direction of relationships between agricultural transformation and rural poverty reduction. Regression analysis was also used to explain the extent to which agricultural transformation influenced rural poverty reduction. The qualitative data was analyzed by first processing it through editing and hand coding on a coding sheet, from where a description of the themes as per the objectives of the study in relation to the studied variables was presented in a narrative form and an interpretation of their meaning made.

FINDINGS AND DISCUSSION

This study was set to examine how agricultural transformation could contribute to poverty reduction with a view of developing strategies and recommendations for poverty reduction in rural areas of Uganda taking Kisoro district as a case study.

Response Rate

The findings in Table 5 depict the size of the respondents who were targeted, the size of the study participants and the response rate.

Table 5: Target Responses and Response Rate

Target Responses	Number of Responses		Response Rate
400	Survey	287	71.8%
	Interviews/ Focus Group discussions	104	26%
	Total	**391**	**97.8%**

Table 5 shows that a total of 400 of individuals dealing in agricultural related activities were targeted. During the study however a total of 391 participated in the study with 287 participating in the Survey representing 71.8% while 104 participated in interviews and focus group discussions thereby representing 26%. The overall response rate was 97.8%.

Biographic Characteristics in the Survey

To examine how agricultural transformation could contribute to poverty reduction the study first established the biographic characteristics of the study participants in agricultural related activities in Kisoro district. The results were as presented in Table 6.

International Journal of Agriculture
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www.iprjb.org

Table6: Biographic Characteristics of the Study Participants in the Survey That Were Involved in Agricultural Related Activities

Biographic Characteristic		**Frequency (N = 287)**	**Percentage (%)**
Gender	Male	261	90.9
	Female	26	9.1
Age in Years	<30	4	1.4
	30-39	90	31.4
	40-49	117	40.8
	50-59	76	26.5
Marital Status	Single	4	1.4
	Married	270	94.1
	Widow/Widower	4	1.4
	Divorced	9	3.1
Highest Academic Attainment	Primary	14	4.9
	Secondary	6	2.1
	Tertiary	267	93.0
Occupation	District technical staff	224	78.0
	Business Person	41	14.3
	Agricultural Industrialist	3	1.1
	Agricultural/ Veterinary Officer	19	6.6
Time spent in Agricultural related activities	1-5 years	37	12.9
	6-10 years	39	13.6
	more than 10 years	211	73.5
Monthly Income	<100,000	17	5.9
	100,000-<500000	76	26.5
	500,000- <1million	114	39.7
	1 million and above	80	27.9

Source: Primary Data (2020)

In this study, a total of 287 individuals participated in the survey of examining how agricultural transformation could ensure rural poverty reduction. The study results also indicated that technical staff involved in farming activities were 224 (78.0%), business persons involved in agricultural related activities were 41 (14.4%), agricultural industrialists were 3 (1.1%) and also agricultural/ veterinary officers were 19 (6.6%). Most of the participants in the study being 211 (73.5%) had spent more than 10 years in agricultural related activities and with 114 (39.7%) earning about 500,000 to less than 1million Uganda shillings as their monthly income.

Qualitative data collection through interviews and focus group discussions (FGDs) was conducted on 104 participants on study variables to compliment the findings from the Survey. The participants who were interviewed were 40 who included individual farmers and opinion leaders while 64 participants from seven farmer groups were involved focus group discussions.

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Vol.8, Issue 2, No. 3. PP. 22 - 53, 2023

www.iprjb.org

State of Rural Poverty Reduction in Kisoro District

The table below, shows the studied aspects of rural poverty reduction that included social services accessibility and housing, food security and entrepreneurial activity.

Table 7: Descriptive Results on the State of Rural Poverty Reduction in Kisoro District

Rural Poverty Reduction	Mean	Std. Deviation	Interpretation
Social Services Accessibility and Housing			
People in this community have easy access to medical services	3.84	1.00	
People in this community can now afford medical services	3.09	1.07	
There are government subsidies in education that continue to enable learners to attend and complete schools of their choice	3.05	1.25	
The school education system is now affordable for the learners of this community	3.15	1.23	
Students in this community are able to join schools of their choice once they qualify for them	2.38	1.29	
The costs on electricity connection and consumed units are affordable by people of this community	2.03	1.05	
There is easy access to safe and clean water among community members	3.02	1.25	
Rural people of this community can now afford habitable houses	3.20	1.09	
Sub- Mean & Standard Deviation	**2.97**	**1.15**	**Moderate**
Food Security			
People of this community can now afford having at least two meals each day	3.56	1.13	
The members of this community have access to adequate food according to their preferences	2.43	1.13	
Community members have access to nutritious food that meet recommended healthy dietary requirements	2.24	1.09	
Sub-Mean & Standard Deviation	**2.74**	**1.12**	**Moderate**
Entrepreneurial Activity			
Rural people are actively involved in enterprises that generate income to them	2.94	1.11	
There is growth of enterprises set up by rural people in this community	3.08	1.11	
Sub- Mean & Standard Deviation	**3.01**	**1.11**	**Moderate**
Pooled Mean & Standard Deviation	**2.92**	**1.14**	**Moderate**

Scale: 4.20-5.00 Very High, 3.40-4.19 High, 2.60-3.39 Average, 1.80-2.59 Low, 1.00-1.79 Very Low

Source: Primary Data (2020)

The findings from the study showed moderate levels of rural poverty reduction in Kisoro district (*Mean* = 2.92, *SD* = 1.14). Poverty reduction interventions were crucial if Kisoro district needed to realize development. The measured aspects of poverty are as hereunder.

Social Services Accessibility and Housing

The accessibility to social services and housing as indicators of welfare were moderate in Kisoro district (*Mean* = 2.97). The results indicated that the community highly accessed medical services; moderately accessed safe and clean water; afforded habitable houses medical services and school education system and also received education subsidies that enabled learners to continue attending school. However, access and affordability to these services needed to be improved due to their importance in people's lives. The findings corroborated with the National population and housing census (2014), which established that in Kisoro district, access to safe water by the population was at 33.7 percent, while for electricity, it was at 7.6 percent all being an indicator of low incomes.

The views of the respondents from interviews and focus group discussions revealed that the state of poverty in Kisoro district was high as with people not accessing water safe for domestic use in some areas with majority depending on rain water and some water springs in the valleys and whose water was perhaps not safe since some of them were not protected. It was also expressed that access to medical services was a hard, with some walking long distances to reach health centers as others resorted to using local herbs to treat people which was a health risk.

There was also a low affordability of costs of electricity connection and consumed units by communities as few students were able to join schools of their choice once they qualified for them.

The above expressions gave were an indicator that the state of poverty reduction was still moderate and interventions were needed to enhance on rural poverty fight.

Food Security

The study findings revealed that there were moderate levels of food security among community members in Kisoro district (*Mean* = 2.97). Food security was crucial for the growth and good nutrition of the people. The study findings established that a moderate number of respondents could not by choice afford having at least two meals each day which by implication was a food insufficiency that could lead to malnutrition and poor health. The results collaborated the findings from National population and housing census (2014) where 11.4 percent of households of 5 years and above were having two meals a day and later established by Spring (2016), that only 9.7 percent of population in Kisoro district were food secure.

The views from majority of interviewees and focus group discussion participants indicated that a good number of community members could access food for themselves but were pessimistic of seasonal changes due to bad weather and too much sunshine that at times led to low yields of staple food crops like bananas, Irish potatoes, maize among others. However, the study findings further established a few community members had access to adequate food of their preferences and to nutritious food that met recommended healthy dietary requirements for a healthy body.

Entrepreneurial Activity

The level of entrepreneurial activity was established to be moderate (*Mean* = 3.01). Moderate levels of entrepreneurial activity portrayed average levels of business enterprises necessary for socio-economic development in the community. The study findings showed a moderate number of community members that were actively involved in businesses that generated income to them.

However, views from some of the interviewees revealed that some people were involved entrepreneurial activities for their income like brick making, charcoal burning, retail shops, buying and selling produce like beans and maize, barber shops among others from where they obtained some income to meet their basic needs like school fees for their children in schools.

Agricultural Transformation in Kisoro District

In this study, agricultural transformation descriptive statistics were processed for aspects specifically farming practices, agro-processing, marketing and government policies. The study results were as presented in Table 8.

Table 8: Descriptive Results on the State of Agricultural Transformation in Kisoro district

Agricultural Transformation	Mean	Std. Deviation
Farming Practices		
Farmers are trained on new agronomic farming practices for enhanced land productivity	2.73	1.27
Farmers have been trained on new ways of soil fertility management practices for enhanced land productivity	3.06	1.15
Farmers have been trained on better post-harvest handling practices for enhanced land productivity	2.79	1.17
On-the-farm trainings of new agricultural methods are often conducted among farmers in this community	2.67	1.15
Study tours for advanced agricultural farming practices are conducted for farmers for enhanced land productivity	2.69	1.22
Agricultural extension and advisory services are readily accessible to farmers whenever required	3.08	1.24
Sub Mean & Standard Deviation	**2.84**	**1.20**
Agro-Processing		
There are agro- processing trainings for farmers for value addition to agricultural produce	2.50	1.16
There is publication of research on transformation of local produce into value added agricultural products	2.29	1.06
Sub Mean & Standard Deviation	**2.40**	**1.11**
Marketing		
Agribusiness and market oriented production trainings are conducted for people involved in farming	2.64	1.13
Farmers are trained on how to use new technologies like in Information, Communication and Technology (ICT) regarding marketing of their agricultural produce	1.95	0.96
Sub Mean & Standard Deviation	**2.30**	**1.05**
Government Policies		
Farmers are sensitized on the available enabling agricultural policies to boost agricultural production and marketing of produce	2.78	1.24
There is a framework instituted by government for farmers to boost the marketing of agricultural produce	2.78	1.25
Sub Mean & Standard Deviation	**2.78**	**1.25**
Pooled Mean & Standard Deviation	**2.66**	**1.17**

Scale: 4.20-5.00 Very High, 3.40-4.19 High, 2.60-3.39 Average, 1.80-2.59 Low, 1.00-1.79 Very Low

Source: Primary Data (2020)

The study results showed that there was a moderate level of agricultural transformation (*Mean* = 2.66, *SD* = 1.17). Agricultural transformation is essential in enhancing production of better quality of outputs which in turn leads to higher prices and incomes, in addition to food and nutritional, security and employment. Therefore, high levels of agricultural transformation were essential for economic development and poverty reduction. In his study, Anik, *et al.,(*2017), underscored the importance of agriculture in economic development which could be attained by investment in agricultural education, research and development, land reforms and good tenurial policies. The findings from aspects of agricultural transformation are discussed and interpreted as hereunder.

Agricultural Transformation through Farming Practices

The study findings revealed that there were moderate levels of agricultural transformation through farming practices (*Mean* = 2.84). This result demonstrated that there was need to continue bettering farming practices as they were necessary for agricultural production and could enhance agricultural productivity and quality and higher prices for agricultural produce. The community members also expressed that the level of agricultural transformation was still average as stated by key informants that there was some knowledge on better agronomic practices, benefits of fertilizer application on increasing crop productivity though not all the farmers could apply the fertilizers.

Agricultural Transformation through Agro-Processing

The study findings revealed that there were low levels of agricultural transformation through agro-processing (*Mean* = 2.40). Agro-processing was ideal for value addition in agricultural produce because it could enable farmers to fetch better prices for agricultural produce.

The study respondents through the interviews also indicated that agricultural transformation through agro- processing was still low in Kisoro district where foods that were processed were those ones that could be processed before eating mostly maize and millet which had to first be milled before eating. Other crops, processing was not done, example being where people just sold whole batches of matooke or ripe bananas with a few who squeezed juice out of them using the local means by the use of hands and stumping with legs. The reasons provided by respondents for not processing their produce included lack of training in value addition and expensiveness of processing equipment which renders them unable to secure them.

Agricultural Transformation through Marketing

The study results also showed that there were low levels of agricultural transformation through marketing (M*ean* = 2.30). Lower levels of marketing for agricultural produce lead to limited agricultural transformation and consequently poor quality of agricultural produce, hence lower prices and income.

The qualitative study findings above further indicated that agricultural transformation through marketing was still lacking. It was also pointed out during the interviews that agricultural transformation through marketing was still low among the community members in Kisoro district due to lack of training in on how to use new technologies like in Information, Communication and Technology (ICT) to market their agricultural produce; loan interests that hampered them from hoarding their produce in anticipation of a rise in prices, exploitative middle men and also fluctuation in prices.

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www.iprjb.org

Agricultural Transformation through Government Policies

The study results showed that there were moderate levels of agricultural transformation through government policies (Mean = 2.78). Such low agricultural transformation levels demonstrated need for efforts to improve on them. Similar results were reported in the qualitative findings from the interviews which also indicated moderate level of agricultural transformation through government policies where some respondents indicated that they were not aware of any policies or trained on them. There was also lack institutional framework by the government to help farmers in marketing their produce.

Correlational findings between Agricultural Transformation and Rural Poverty Reduction in Kisoro District

Pearson correlation was carried out to establish whether there was a relationship between agricultural transformation and rural poverty reduction in Kisoro district with results presented in

Table 9: Correlational Findings between the Aspects of Agricultural Transformation and Rural Poverty Reduction in Kisoro District

Correlations						
		Poverty_Redn	**Farming_Prac**	**Agro_Process**	**Marketing**	**Govt_Policies**
Poverty_Redn	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	287				
Farming_Prac	Pearson Correlation	.253**	1			
	Sig. (2-tailed)	.000				
	N	287	287			
Agro_Process	Pearson Correlation	.351**	.502**	1		
	Sig. (2-tailed)	.000	.000			
	N	287	287	287		
Marketing	Pearson Correlation	.246**	.595**	.592**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	287	287	287	287	
Govt_Policies	Pearson Correlation	.329**	.447**	.447**	.450**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	287	287	287	287	287
****. Correlation is significant at the 0.01 level (2-tailed).**						

The results in Table 9 showed all aspects of agricultural transformation namely; farming practices (r = 0.253, $p< 0.05$), agro-processing (r = 0. 351, $p< 0.05$), marketing (r = 0.246, $p< 0.05$), and government policies ($r= 0.329$, $p<0.05$) had a positive and significant relationship with poverty

reduction. This result showed that poverty reduction increased with better in farming practices, agro-processing, marketing and appropriate government policies.

Multivariable Results for the Effect of Agricultural Transformation on Rural Poverty Reduction in Kisoro District

At multivariable, a regression analysis was performed to establish the effect of agricultural transformation on rural poverty reduction in Kisoro district and the results were presented in table

Table10. Regression Model Results for the Effect of Agricultural Transformation on Rural Poverty Reduction in Kisoro District

Agricultural transformation					95.0% CI	
		Coefficient	S.E	Sig.	Lower	Upper
(Constant)		2.059	.136	.000	1.792	2.325
Farming_Prac		.037	.052	.475	-.066	.140
Agro_Process		.170	.049	.001	.074	.265
Marketing		-.018	.056	.751	-.129	.093
Govt_Policies		.141	.044	.002	.054	.228
R	= .402					
R^2	= .162					
Adj R^2	= .150					
$F_{(2,282)}$	= 13.593					
P-Value	= 0.000					

a. Dependent Variable: Poverty_Redn

The results in Table 10 show that agricultural transformation aspects namely; farming practices, agro- processing, marketing and government policies explained only 15.0% of the contribution on poverty reduction (adjusted $R^2 = 0.150$). However, only two aspects of agricultural transformation namely; agro-processing (β= 0.170, p = 0.001) and government policies (β = 0.141, p = 0.002) had a positive and significant influence on poverty reduction.

On the other hand, farming practices had a positive but insignificant effect (β = 0.037, p = 0.475), while marketing had a negative as well as insignificant influence on poverty reduction (β = -0.018, p = 0.751). The magnitudes of the respective coefficients suggested that agro-processing had the most significant influence on poverty reduction followed by government policies. Efforts that aim at reducing rural poverty need to embrace agro- processing and government policies in their strategies.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study was to examine how agricultural transformation could contribute to poverty reduction in rural areas of Uganda taking Kisoro district as a case study. In Uganda, poverty in rural areas had remained a challenge with numerous government approaches in tackling it having no sustainable remedy. Among the rural poverty reduction strategies that had been adopted by government included AAMP, NAADS, YLP, UWEP, SAGE, OWC, infrastructural developments

like roads, electricity, safe water supply among others and above all every five-year period, the government came up with a poverty reduction strategy under the National Development Plans which had underlying poverty reduction programmes. However, all poverty reduction efforts registered less or no formidable successes since poverty in general and poverty in rural areas had remained a challenge in Uganda as manifested by low access of the population in Kisoro district to electricity (7.6%) and piped water (33.7 %), high illiteracy levels, food insecurity, poor housing conditions with 84.6% of households living in semi- permanent dwelling units among others (UBOS, 2017). This therefore brought a question of the relevancy of government strategies in addressing poverty in rural areas.

The purpose of the study was therefore to examine how agricultural transformation could contribute to poverty reduction with a view of developing, strategies and recommendations that enhanced poverty reduction in Kisoro district. However, the specific objectives were: to establish how farming practices could ensure rural poverty reduction in Kisoro district; to explore the effect of agro-processing on rural poverty reduction in Kisoro district; to find out how marketing of agricultural produce and products could ensure rural poverty reduction in Kisoro district; and to determine the relationship between agricultural transformation policies and rural poverty reduction in Kisoro district.

The study was carried out in Kisoro district where the respondents included individual household agricultural farmers and farmer groups, agricultural industrialists, district technical staff, business entrepreneurs, political, religious and other opinion leaders drawn district wide for quantitative data except for qualitative respondents who were drawn from Bukimbiri, Kanaba, Nyakabande, Nyundo, Murora, Nyabwishenya, Kirundo, Nyakinama, Chahi, Nyarubuye and Busanza sub counties as representatives of all lower local governments. All the selected respondents were those either affected by rural poverty or involved in poverty reduction efforts through agriculture.

Out of the targeted sample of 400 respondents, the total number of study respondents who participated in the study were 391 which represented 97.8 % response rate and were all involved all involved in agriculture related activities. Of the 391 study respondents, 287 constituting 71.8 % participated in the survey and included district technical staff, business persons, agricultural industrialists, while the rest 104 constituting 26% comprised of individual farmers and farmer group members, participated in interviews and focus group discussions for their opinions.

The study used both quantitative and qualitative approaches and a cross- sectional survey method of descriptive design with pragmatism research paradigm was also used. The methods used in the study for data collection were; survey, interviews, observations and documentary review of both primary and secondary documents; while the tools used included self- administered questionnaires, interview guide, interview schedule, observation plan, observation checklist, a camera (phone) and Stereo IC Recorder (Sony: ICD- PX470).

The study findings established that: -

Farming practices could significantly ensure rural poverty reduction in Kisoro district. The findings established that there was a positive and significant relationship between farming practices and rural poverty reduction ($r = 0.253$, $p < 0.05$). Farming practices had a positive but

insignificant effect (β = 0.037, *p* = 0.475) on poverty reduction. This result showed that poverty reduction increased with better in farming practices

Agro- processing had a significant effect on rural poverty reduction in Kisoro district. The findings established that there was a positive and significant relationship between agro- processing and rural poverty reduction (r = 0. 351, *p*< 0.05). Agro-processing had a positive and significant influence on poverty reduction (*β*= 0.170, *p* = 0.001). This result demonstrated that improvements in agro- processing were followed by improvements in poverty reduction. Marketing of agricultural produce and products could significantly ensure rural poverty reduction in Kisoro district (r = 0.246, *p*< 0.05), though with a negative as well as insignificant influence on poverty reduction (β = -0.018, *p* = 0.751).

The findings established that there was a positive and significant relationship between agricultural transformation policies and rural poverty reduction (*r*= 0.329, p<0.05) with a positive and significant influence on poverty reduction (β = 0.141, *p* = 0.002). t is notable from the findings that, agro-processing had the most significant influence on poverty reduction followed by government policies which therefore needed strategies to promote them.

On the whole, the findings established that aagricultural transformation explained 15 % of the contribution on rural poverty reduction (adjusted R square = 0.150) which implied that a unit improvement towards agricultural transformation had an effect in reducing rural poverty by up to 15%. However, much as there was a significant the contribution of agricultural transformation towards poverty reduction under the existing practices, the level of contribution was quite low (15%) and therefore necessitated and improvement on the existing practices and a search for new approaches to significantly contribute towards poverty reduction.

Recommendations

Agricultural Transformation (AT)

According special focus on agricultural transformation strategy is important since majority of the rural population obtain their livelihoods from agricultural sector that can systematically and sustainably reduce rural poverty. However, it is notable that agriculture is predominated by subsistence farming practices that could need to be commercially transformed for increased quantity and quality of output for market. In order to realize systematic and sustainable agricultural transformation necessary for poverty reduction in rural areas of Uganda, precision agricultural practices along the value-chain should therefore be adopted and/ or promoted. This therefore necessitates promotion of better agricultural farming practices like improved agronomic practices (better varieties of seeds/ crops and livestock for better and higher yields; organic fertilizer application; proper timing of planting, weeding and harvesting; pests and disease control; proper measurements among others), soil fertility management practices and post-harvest handling practices; provision and storing water for irrigation to avoid reliance on rain fed agriculture; all which should be value- chain led under a precision agricultural approach.

Agricultural transformation could also entail supporting and promoting agro-processing for value-addition; provision of better marketing opportunities for agricultural produce/ products; agricultural development enabling policies necessary for transformation of the agricultural sector from a largely subsistence to commercialized sector for enhanced productivity, output, quality,

employment and associated incomes crucial in poverty reduction. A transformed agricultural sector could also in turn provide the desired inputs and outputs to non- farm sectors for incomes necessary for poverty reduction.

Innovative Transfer Programs (ITPs)

Communities could be involved in agricultural transformative activities that could ultimately result into general enhancement of productivity and earnings of individuals and organisations which in turn could lead to capital accumulation and multi-sectoral growth and could be in the form of;

Agro-Ecological Zoning

Agro-ecological zoning could be adopted and blended with three agrarian structures/ systems being green revolution, plantation agriculture, and commoditized mixed farming for enhanced production and competitiveness, all aimed at commodification of produced goods and services for market. However, this is a government approach that would require an enabling agricultural policy shift for land reforms; supportive policies; and integrated development policies like credit facilities to farmers, rapid infrastructural development, exploring products' market for agriculturalists, and ensuring the availability of inputs.

Modern Technologies

The investment in transfer and adoption of modern technologies for promoting efficiency and effectiveness along the production chain could significantly improve on productivity and products quality for competitive marketing and accrued higher incomes. The technologies could include;

Farm Automation

Farm automation using fabricated simple farming machines like walking tractors for cultivation, sowing, harvesting, among others to compliment and in some instances substitute the popular rudimentary farming tools like hoes, pick axes, pangas which are quite labour intensive, laborious to use, and characterized by low output per unit area of land and labor utilized. The government could support organized groups or associations and individuals to access credit for procuring such machinery and give incentives like tax holidays to local companies producing them so that they are produced at relatively cheap prices.

Precision Agriculture

There is need for the government to economically empower its population through precision agriculture for improved and better quality output appropriate for market competiveness with resultant higher incomes as a poverty reduction programme strategy. Under precision agriculture, crop irrigation should be encouraged to mitigate the bad effects of dry weather climates. Precision agriculture could however be complimented with soil and crop monitoring and management practices, climate and moisture levels' monitoring for proper timing in crop farming, testing of products for quality could yield higher and better quality agricultural output for market.

Irrigation

Small scale household irrigation projects could be introduced for crops to be supplied with water throughout the year to mitigate the impact of the dry spells in the months of June, July and August which affect crop growing and output levels. Sprinkler and drip irrigation systems could be

promoted among households and organized farmer groups for adoptability. Government could also introduce micro and medium irrigation projects to areas of need.

Artificial Intelligence (AI)

Use of Artificial Intelligence (AI) technologies like devices to collect data on soil fertility, retention of water by soils among others to determine which crops best suit certain localities for better yields and how soil could be managed. Government could introduce AI technologies to advise the farmers and also inform on agricultural policy on appropriate farming practices for better yields that would generate higher financial returns necessary for poverty reduction.

Soil and Land Management Practices

Better soil and land management practices in addition to water conservation practices should be adopted. These could include promotion of organic farming through use organic fertilizers for soil management which could be achieved by encouraging use of farm yard manure from compost and livestock. There could be encouragement of households to undertake mixed farming by intensively rearing domestic animals and birds to provide organic manure to crops than using inorganic fertilizers that deplete the soils of their organic content. Contour bands in hilly areas, and also digging trenches for water conservation could also be encouraged.

High-Pay off Inputs

Access to high-pay off inputs like high seed varieties, better livestock breeds for high and better yields could also enhance on productivity, market competitiveness and incomes necessary for economic growth and poverty reduction in rural areas. Government ought to provide high pay off agro- inputs to farmers to boost and commercialize agriculture. Agro- inputs provided by the Government to farmers could be distributed after a Village- Up approach in identifying the rightful beneficiaries by the Village Agricultural Teams (VATs) who could understand the communities better but with the supervision by government extension staff. The selection of farmers to benefit from the inputs could follow established criteria. This could reduce or curtail on the tendency of having the well-to-do people in the communities being the ones regularly benefiting from the distributed inputs either because they know how to navigate the system due to connections or they claim potentiality in utilizing the inputs to the detriment of the majority needy people who are presumably a target of government in poverty reduction efforts.

Diffusion Practices

Diffusion practices is where agriculturalists access appropriate agricultural, entrepreneurial and marketing information and skills through trainings. Trainings could also focus on drones and bees technology for their conservation as they are necessary for crop pollination, greenhouse farming for those with financial capital, vertical farming for those with low land holdings, new feeding systems, fertilizer deep placement, fungal farming, livestock farming and diary cubs all which could promote commercial production and productivity for enhanced incomes.

Other than training of farmers on better agronomic practices; there could also be trainings on value addition, agribusiness and marketing; soil and land management practices; creation of demonstration farms at either sub county or parish levels to enable farmers have study tours and on-the-farm trainings; support in establishment of agro-processing factories in every sub county

depending on the produce of that sub county and extension workers need to be supervised to efficiently perform their duties. The above technologies could lead to increased production of quality output, earnings and ***induced innovation*** where changes in relative prices could result into development of new methods of doing things where lesser of expensive input or more of cheaper input would be used in the production chain so as to maximize on financial returns and profits crucial for poverty reduction and growth.

Research and Development

Government should invest in agricultural research and development in higher public institutions of learning like Universities among others and also public organisations involved in research. This would enable the country come up with new innovations especially in science and technology are crucial for economic and agricultural transformation of a country. Research could among others focus soil and fertilizer since some fertilizers prove to be destructive to soils.

Government Policies

The government could enhance on enabling policies to transform the agricultural sector.

Village Agricultural Teams (VATs)

The Government of Uganda should introduce VATs to improve on training approaches of the local population in agricultural farming practices and adoption of agricultural technologies. The VATs could be comprised of at least three persons per village selected from within the village community members and trained in agriculture related laws, policies and practices. The VATs could be in charge of training and equipping the village community members with knowledge and skills for better agricultural practices. This is so because, the VATs could be nearer to their people thus easily accessed by farmers for knowledge and skills transfer as compared to the sub county extension workers who are few and based at the sub counties where they expect demand- driven services that the community members fail to appreciate because of the costs involved in accessing them in terms of transport for them to sub counties. The Government could put resources at Districts and Sub County Local Governments for training the VATs while the role of the District/ Sub County extension workers could be supervising and further technical backstopping of the VATs in their activities. The facilitation of VATs, could be from a Sub County budgetary provision charged from the national consolidated fund to cater for their allowances.

Road Infrastructure

The government could invest in road infrastructure development, agricultural produce storage facilities and creating market opportunities for famers' produce in order to address the issue of market disparities. Rural road infrastructure should be developed so as to ease access of agricultural produce and products to the markets. This is so because, most rural agricultural areas are remote which negatively affects the marketability of produce in terms of high costs on transportations, inaccessibility, exploitation of the farmers by middle men who pay them less all resulting into low incomes that substantially do not get the rural farmer out of poverty. Government could also develop an integrated policy on *Burungi Bwansi* where communities provide their own free labour for road infrastructure opening, maintenance and rehabilitation.

Community Agricultural Stores (CASs)

Government ought to address the issue of higher supplies than demand during certain periods which led to low prices, rotting of perishable produce and subsequent losses, by establishing community agricultural stores (CASs) at least at Sub County level and also create linkages for better markets for farmers' produce.

Enterprise Development Loan (EDL) Scheme

Government ought to introduce an Enterprise Development Loan (EDL) scheme targeting farmers and people engaged in other enterprises both at individual level and groups at affordable interest rates which could enable them access inputs for those who would not have ample funds. The Youths livelihood programme (YLP) and (Uganda Women Entrepreneurship programme) which had been giving revolving loans to youth and women respectively were discriminative and less inclusive in nature because men were sidelined yet they were construed to be heads of families and also affected by poverty. The newly introduced Parish Development Model (PDM) was also found to be discriminatory because its Poverty Revolving Fund targeted the poorest of the poor and only those involved in agricultural value- chain thereby leaving other occupations/ enterprises out. An Enterprise Development Loan targeting all potential individuals could address the gaps created by YLP, UWEP and PDM.

Fiscal Policies

The fiscal (taxation) policies on agricultural produce/ products should be fair to keep propping up production and trade for enhanced incomes crucial for poverty reduction.

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