

Review of National Policies Affecting the Spread of Small Mechanization in Rural Tanzania

Njau, E.J., Jaleta, M., et al...

Summary

Agricultural mechanization plays an essential role in agricultural growth and development. In developing world, tailoring mechanization to smallholder farming could enhance farm productivity, increase operated farm area and reduce labor drudgery in major farm operations. In Tanzania, the history of smallholder agricultural mechanization goes to the 1970s where tractors were mainly used on medium to large scale cotton farms and owners of tractors were giving a hired service to smallholder farmers in their neighborhoods (Bishop-Sambrook, 2005). Since then, the government of Tanzania put much emphasis to the expansion and development of smallholder mechanization through different national policies and strategies designed to develop the agricultural sector. Despite the government's efforts, the level of farm machinery use by smallholder farmers in Tanzania is still low. Some of the major challenges include: lack of coordination in linking farmers demand for farm mechanization and the supply of these machineries and their services, the sunk cost nature of farm machinery investments, lack of machinery maintenance services in rural areas, etc. For a more mechanized smallholder farming to take place in Tanzanian agriculture, further strategies addressing these challenges need to be in place.

Keywords: policies, mechanization, productivity, profitability, subsidies, Tanzania.

1. Introduction

Agriculture is the leading sector of the economy in Tanzania, accounting for about half of both the GDP and merchandize exports. About 80 percent of its population of 34.5 million people live and earn their living in the rural areas with agriculture as the mainstay of their living. Economic reforms that have been implemented by the government since the mid-1980s have resulted in a steady growth of the economy. The GDP has improved considerably in the last decade rising consistently to about 6.7 percent in 2004 from 4.0 percent in 1998 while the annual inflation rate has decreased to an annual average rate of 4.5 percent in 2005 compared to 6 percent recorded in 2000. There have also been some improvements in the foreign reserves reaching an equivalent of 8.9 “months of imports” in 2004 compared to 6.3 “months of imports” in 2000. The value of foreign direct investment has also increased from US\$ 172.2 million in 1998 to US\$ 260.2 million in 2004 representing an increase of over 50 percent.

Despite the impressive macroeconomic achievements resulting from the reform programs, agricultural growth and rural poverty reduction continue to present daunting challenges. Although there has been a gradual increase in the growth rate of the agricultural sector in Tanzania in the 1990s, rising to 3.6 compared to 2.9% and 2.1% in the 1970s and 1980s respectively, this is considered to be unsatisfactory as it has not been able to bring a sufficient number of the rural poor above the poverty line as about 50 percent of the rural population still lives below the poverty line (ASDS, 2001).

Agriculture, particularly smallholder farming, plays a major role in the overall economy of most Sub-Sahara African countries. However, the way farming is practiced and the source of farm power used are slightly different for different regions in the continent. In most countries, human muscle using hand-hoe is the dominant source of farm power used in growing crops. Tanzania is one of these countries where cultivation of about 64% of the farmland in the country is depending on human muscle (MAFSC, 2013).

Table 1. Farm machineries (tools and power sources) in Tanzania

Farm tools and power source	Amount (in 2014)
Tractors	10,064
Power tillers	6,348
Animal drawn ploughs	585,000
Hand hoe	14,000,000
Oxen	1,300,000

Source: MAFC, 2014

Under such circumstances, expanding farmlands to exploit the existing natural resource potential for agriculture is challenging. Recent data shows that Tanzania has 44 million hectares of arable land where only 23% is under cultivation (MAFC, 2006).

According to the same source, farm power was considered as a major limiting factor in increasing agricultural production. With this recognition, the Tanzanian Government has been formulating different agricultural mechanization policies and implementing different strategies that could facilitate the shift from human muscle powered farming towards draft animal and tractor powered farming.

Since 1970's, a number of agricultural development policies and strategies were formulated and implemented in Tanzania. Some of these policies and strategies have put explicit guidance on the need and development of agricultural mechanization in the country. Before the introduction of Structural Adjustment Program (SAP) in 1980s, the Government of Tanzania was directly putting much effort on agricultural mechanization through importation of tractors and other machineries. However, the efforts were not successful in achieving the expected outputs and attaining strong agricultural mechanization due to poor management, weak infrastructure, poor equipment maintenance, difficulty in obtaining spare parts, etc.

The introduction of SAP opened doors for more involvement of the private sector in importing and distributing tractors and other farm implements whereas the government's role shifted mainly to facilitating the business environment for the development of agricultural mechanization (Bishop-Sambrook, 2005). Key documents such as Tanzania Development Vision 2025 (TDV 2025), Poverty Reduction Strategy Paper (PRSP), Rural Development Policy (RDP), Agricultural Sector Development Strategy (ASDS), Agricultural Sector Development Programme Framework

and Process document, the National Strategy for Growth and Reduction of Poverty (NSGRP) popularly known as MKUKUTA (in Kiswahili), the Agricultural Sector Development Programme (ASDP) and recently Agriculture First (*Kilimo Kwanza*) have been operationalized to guide the process. All these strategies, policies were promotion of agricultural mechanization, through the Ministry of Agriculture, Food Security and Cooperatives and strong private-public partnerships. The mechanization initiative covers a wider spectrum that accommodates small-scale mechanization using two-wheel power tillers to medium and large-scale four-wheel tractor based mechanizations.

The main objective of this paper is to review national policies and strategies related to agricultural mechanization and farm power use in Tanzania. Moreover, the paper assesses how different policies contributed (both positively and negatively) towards the current development in agricultural mechanization sector and use of agricultural machineries by smallholder farmers in the country.

2. Analytical Framework

In this paper, we review policy effects on the development and expansion of agricultural mechanization in Tanzania at three interrelated tiers. First, we look at national policies affecting machinery imports (tractors and farm implements) at a cross-border trade level. Policies formulated and regulations set at this level either encourage or discourage the quantity and type of tractors and farm implements imported. Second, imported or manufactured agricultural machineries are passed to end users through effective marketing channels where actors at each stage in the channel are getting proper incentives to keep the business running. Policies and regulations affecting the structure of domestic markets (free competition, incentives for infant industries, access to credit facilities, etc.) definitely influence whether machinery manufacturers, dealers, distributors, machinery maintenance service providers and machinery operators could enter and stay in the business. Third, given the availability of farm machinery service and demand for these services, farm level machinery use depends on whether farmers are able to afford to buy machineries or able to pay fees for hired services. Policies directly or indirectly affecting smallholder farmers' income influence the demand for machinery use and services.

3. Inventory of Policies and Strategies Related to Agricultural Mechanization

In Tanzania, since 1970s a number of national policies that directly or indirectly promoting and facilitating agricultural mechanization have been formulated. There are also some agricultural development strategies encompassed the implementation of mechanization policies.

The economic reform programs implemented by the Tanzanian Government have been based on the philosophy that Tanzania is committed to market economy whereby the private sector will take the lead in driving economic growth. The State will play a regulatory role while creating an enabling environment for the private sector to operate. This philosophy is evident in almost all policy statements made since 1986 and in particular after 1996. The private sector has started playing an ever-increasing role in creating incomes and employment. The policy environment is therefore compassionate for promoting agricultural mechanization in the country. Success of the mechanization strategy will mostly depend on targeting these favorable policies. In this section, these policies and strategies are briefly discussed in their chronological order.

3.1. The Tanzania Rural Development Policy (1996)

The Rural Development Policy points out the need to increase agricultural productivity by improving markets, private sector investment, physical infrastructure, human capital, and demand-driven research and extension services. One key area of focus is improved access to urban markets and forging stronger networks to facilitate access to financing and skilled capacity.

3.2. The Tanzania Poverty Reduction Strategy Paper (PRSP)

The Poverty Reduction Strategy Paper (PRSP) was prepared in response to the enhanced Highly Indebted Poor Countries (HIPC) initiative. Through the HIPC, Tanzania was in April 2000, declared eligible for debt relief. The resources expected to be freed up from debt relief will be channeled towards poverty reduction.

The PRSP creates a process for a more systematic involvement of the private sector and civil society in the fight against poverty. The Government will implement the Poverty Reduction Strategy in the rural areas through two complementary initiatives. These are the Agricultural Sector Development Strategy (ASDS) and the Rural Development Strategy (RDS), which

together with agriculture cover other dimensions of poverty reduction, including non-farm economic activities, social services and economic infrastructure.

3.3. The Tanzania Agricultural and Livestock Policy (1997) / (2006)

The evolution of agricultural policy has been strongly influenced by the changing macro-economic policies. The policy recognizes the role of the private sector, including the micro and small-scale sector in achieving the national goals of social and economic development and puts emphasis on creating an enabling environment for the private sector to participate effectively in all aspects of agricultural production, processing, storage and marketing.

In mechanization, the policy document states that the government objective is to promote the supply of sufficient farm machinery, equipment and tools to the farming community by the private sector in order to meet demand at reasonable costs. It lists the following policy statements:

- ✚ The Government will establish effective information system regarding farm implements, machinery and equipment.
- ✚ The Government will continue to promote and encourage agro-mechanization, and modernization in the country through extension services and provision of regulatory services for farm implements including strengthening machinery-testing services.
- ✚ Private sector will be encouraged to establish and run tractor hire centers.
- ✚ The Ministry of Agriculture will encourage and support increased use of draught animals for both cultivation and transport purposes. To promote wide use of draught power, the Ministry will strengthen its extension and veterinary services with particular attention being given to both dry season feeding and husbandry of draught animals.
- ✚ The Government will rationalize the animal traction training whereby training of farmers and animals will be harmonized and training will be shifted to the existing training institutes, curricula will be improved and adequate facilities will be provided.
- ✚ The Government will encourage the private sector, non-government organizations (NGOs) and local communities to own and run Ox Training Centre.
- ✚ The Ministry will support the development and adaptation of appropriate farm equipment.

- ✚ Besides cattle, the Ministry realizes the important contributions made by other types of draught animals including asses, donkeys, mules, horses, water buffaloes and camels. It will encourage farmers and livestock keepers to use these animals and will prepare a program to enhance their development through breeding and adaptation for draught purposes.

3.4. Tanzania Development Vision 2025 (1999)

In response to challenges that still need to be overcome to accelerate growth and reduce rural poverty, the Government adopted the Tanzania Development Vision 2025 (TDV) to provide broad guidance on the strategic goals of social and economic development in the country.

The Tanzania Development Vision 2025 envisages raising the standards of human development of Tanzanians to those of a medium developing country by the year 2025. The economy will have been transformed from a low productivity agricultural economy to a semi-industrialized one led by modernized and highly productive agricultural activities, which are effectively integrated and buttressed by supportive industrial and service activities in the rural and urban areas. This will be achieved through increased productivity and competitiveness, increased export earnings and investment in human capital. Agriculture has been identified as one of the priority sectors for achieving these goals.

3.5. Agricultural Sector Development Strategy (2001)

The Government launched the Agricultural Sector Development Strategy (ASDS) in October 2001 as an instrument for stimulating growth and reducing poverty. The primary objective of Agricultural Sector Development Strategy (ASDS) is to create an enabling and conducive environment for improving productivity and profitability of the agricultural sector as the basis for ensuring household food security, improved farm incomes and rural poverty reduction in the medium and long-term. ASDS provides a basis for action by both the public and private sector to support Tanzania's efforts to stimulate agricultural growth and reduction of poverty.

The ASDS recognizes that the subsistence dominated farming must be gradually transformed into profitable agricultural production and the abundant land resource allows increase in production through cultivated land expansion as it points out that the "hand-hoe

syndrome” among Tanzanian smallholder farmers is both a cause and symptom of rural poverty. The strategy points out the following areas of intervention in agricultural mechanization:

- According to the private sector the requisite incentives to set up mechanization centres to provide machinery and equipment hire services to smallholder farmers.
- Provision of financial incentives by the Government to local institutes of technology to design and develop appropriate farm tools and machinery that are suitable for different categories of farmers and farming systems.
- Giving the private sector appropriate incentives to develop technologies using locally available, renewable (sustainable) energy sources of the sun, wind and biogas.
- To strengthen support services to promote mechanization, especially among small-scale farmers.
- Financing of research at public and private institutions in order to accelerate development of appropriate smallholder agricultural mechanization and agro-processing technologies.
- Supporting training and demonstrations on the use of new agricultural technologies, through the extension services and private sector.
- Facilitation of the private sector to develop agro-industries in the rural areas.

3.6. Agricultural Sector Development Programme (ASDP)

The Agricultural Sector Development Programme (ASDP) provides the overall framework and process for implementing the ASDS. The ASDP is part of an operational response to a set of policies, strategies and initiatives designed to re-orientate and reinvigorate the national economy.

The program is underpinned by national policies supporting, in particular;

- i. Focus on poverty reduction
- ii. Decentralization of many public sector responsibilities to Local Government Authorities (LGAs)
- iii. Increased participation and involvement of local communities in decision making and
- iv. Shift towards private sector leadership in production, marketing, processing and service delivery.

The two main objectives of the ASDP are:

- (i) To enable farmers to have better access to agricultural knowledge, technologies, marketing system and infrastructure, and

- (ii) To promote private investment based on an improved regulatory and policy environment so as to contribute to higher productivity, profitability and farm incomes.

Five key operational components have been identified for implementations which are: policy, regulatory and institutional arrangements; agricultural services that include research, technical services and training; public investment; private sector development, market development and agricultural finance; and cross-cutting and cross-sectors issues including gender, health, education, infrastructure, land tenure and telecommunication.

The program has three components; that is, sub-program;

- a. Comprising of field level activities in direct support to agricultural production and processing, sub-program
- b. Comprising of public sector activities at national level in support to agricultural development and sub-program
- c. Covering cross cutting issues.

The implementation of ASDP will be at the district level through the District Agricultural Development Plans (DADPs) and at national level where it will be guided by the Agricultural Sector Lead Ministries (ASLMs) Medium Term Strategic Plans. Communities and local Government authorities will increasingly identify interventions and activities and set local priorities through the DADPs and DDPs.

The district component comprises of three sub-components:

- i. Local Agricultural Investments which will support district level investments based on DADPs on a cost-sharing basis. Investments will be made in accordance with local needs, as determined through local participatory planning and budget processes.
- ii. Local Agricultural Services which will shift to contracting of agricultural services and greater control over resource allocation by farmers. It will provide funding for both public and private Agricultural Service Providers (ASPs) through the Agricultural Extension Block Grants.
- iii. Local Agricultural Capacity Building and Reform which will provide support to capacity building and reform, which will lead to improved district agricultural planning, agricultural investment appraisal and agricultural services reform. Training will be provided for farmer group formation and facilitation, technology testing, group leadership

and networking. Funds will be channeled directly to the district through capacity building grants.

At the National Level support will focus on five areas:

- a. Reforming of agricultural service, primarily research and extension.
- b. Improving overall sector policy, regulatory and legal framework; marketing and private sector development; capacity building; information and communication.
- c. Investing in strategic national level irrigation infrastructure and technical support for local level irrigation investment.
- d. Enhancing food security.
- e. Establishing a framework to ensure the quality and technical soundness of investments and delivery of services at local levels.

The ASDP will therefore be the leading instrument for financing and monitoring public sector support for reinvigorating Tanzania agriculture. The role of ASDP is to bring together, in a coherent sequence, prioritized sub-programmes and to guide central Government investment to support field level activities in the agricultural sector. In mechanization, the ASDP emphasizes promotion and utilization of labor-saving technologies (such as appropriate forms of mechanization, minimum tillage techniques, etc.) as central to improvement of labor productivity.

3.7. Tanzania Agriculture and Food Security Investment Plan (TAFSIP).

TAFSIP is a framework formulated to assist achievement of TDV 2025. It is a 10-year road map for agricultural and rural development that identifies priority areas for investment and estimates the financing needs to be provided by the government, the private sector and its development partners to support the on-going implementation of the main long-term agricultural sector development programmes. It is a framework for the prioritization, planning, coordination and harmonization of investments that will drive Tanzania's agricultural development over the next decade.

3.8. Revised ASDS-2

Revised ASDS-2 is under preparation to reflect the changes in the overall economic environment and the policies and programmes that emerged over the years, and to set a new direction for the

development of the sector. The revised ASDS integrates the CAADP objectives and reflects most of the vision and principles enunciated in the TAFSIP, particularly the need to continue the pursuit of a sector-wide approach to plan, coordinate and harmonize the resources needed to accelerate implementation of existing initiatives and to incorporate new initiatives which address national, regional and sectorial development priorities. Largely along the line of TAFSIP, the ASDS-2 identifies priority areas for investment and estimates the financing needs to be provided by the government, the private sector and its development partners to support the on-going implementation of the main long-term Agricultural Sector Development Programmes. The revised ASDS-2 also details the policies, strategies, and priority areas for agricultural and rural development and provides an opportunity for achieving the goals of Vision 2025, as well as the economic growth and poverty reduction objectives specified in MKUKUTA/MKUZA.

3.9. 'Big Results Now' (BRN)

The lagging pace of implementing Vision 2025 has prompted the government to embark on a new model dubbed 'Big Results Now'. This initiative has started with six sectors, namely agriculture, energy, education, resource mobilization and transport. Expert labs prepared priority implementation plans for the next two years. The objective of the agriculture BRN plan is to address critical sector constraints and challenges and to speed- up agriculture GDP, improve smallholder incomes and ensure food security by 2015 mainly through smallholder aggregation models for main cereals and high potential crops contributing to import substitution, farm income and food security. Three programmes were prioritized including: (i) building a warehouse based trading system for maize (275 warehouses in 8 districts); (ii) building 78 professionally managed commercial rice irrigation schemes (in 10 districts); (iii) supporting 25 commercial farming (agri-business) deals in the SACGOT region – 150.000 ha (sugar cane, rice, etc.). Although BRN provides important impetus in terms of political will, leadership and coordination across ministries, the financing of proposed activities and implementation modalities, coordinated through a Presidential Delivery Bureau and Agricultural Delivery Division (ADD).

3.10. National Strategy for Growth and Reduction of Poverty – NSGRP / MKUKUTA

The National Strategy for Growth and Reduction of Poverty (NSGRP/MKUKUTA) is the second national organizing framework for putting focus on poverty reduction high on the country's development agenda. The NSGRP keeps in focus aspirations of Tanzania's Development Vision 2025 for high and shared growth, high quality livelihoods, peace, stability and unity, good governance, high quality education and international competitiveness. It is committed to the Millennium Development Goals (MDGs), as internationally agreed targets for reducing poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women by 2015.

The NSGRP builds on the Poverty Reduction Paper, the Tanzania Mini-Tiger Plan, the National Poverty Eradication Strategy, the Tanzania Assistance Strategy and the ASDS. The target GDP growth rate for the NSGRP is 6-8% per annum over the period 2005 - 2010 and requires that the pattern of growth and benefits at the macro-level be translated into welfare outcomes. It adopts the "outcomes approach" which counts on the contribution of all sectors towards specific outcomes on growth, poverty reduction and improved quality of life and hence encourages inter-sector collaboration.

Three major clusters of poverty reduction outcomes, are identified by the NSGRP, these are growth and reduction of income poverty; improvement of quality of life and social well-being and good governance. Each cluster contains specific goals and actions; and many of these are interrelated and support each other and cut across various sectors.

The NSGRP recognizes that, the constraints to rural development are largely related to those in the agricultural sector which include low productivity of the land, labor and production inputs; underdeveloped irrigation potential; limited capital and access to financial services; inadequate agricultural technical support services; poor rural infrastructure; erosion of the natural resource base; environmental degradation; weak producers organizations; limited technological capacity and depressed prices of primary commodities both in local and global markets.

The NSGRP recognizes that high economic growth is one of the major conditions for poverty reduction and identifies 12 major sources of growth that Tanzania will need to focus on. Among them are increases in factor productivity – focusing on technological change with particular attention to rural/agricultural productivity and associated linkages with industry and private sector development.

In these, the agricultural sector plays a dominant role with mechanization featuring in some of the proposed interventions to be undertaken such as:

- Promoting and increasing utilization of modern farming technologies.
- Enhancing agro processing.
- Promoting food storage technologies.
- Promoting environmentally friendly farming technologies.
- Scaling up investments towards modernizing small, medium and large scale agriculture for increased productivity and profitability.
- Promoting off-farm activities including small and medium size enterprises with particular emphasis on agro-processing.
- Enhancing skills, apprenticeship and entrepreneurship training especially for the SMEs.
- Increasing access to rural micro-financial services to farmers especially the youth and women.

The NSGRP recognizes too that weak agro-industries and poor linkages within the marketing, processing and production chains affect the performance of agriculture, as do poor market-orientation and inadequate processing of commodities, coupled with high levels of waste. The poor state or lack of rural infrastructure is causing high transport costs for distribution and marketing of inputs and produce, leading to lower farm gate prices to the producer. Incomplete liberalization and poor regulation of food markets critically constrains agricultural development. All these lead to low profitability for the sector.

3.11. Tanzania Agricultural Mechanization Strategy (TAMS)-2006

This strategy was designed to support the Poverty Reduction Strategy and create a development environment that will contribute to enabling rural communities and households achieving sustainable livelihoods through identifying short and medium term priorities that will support the goal of sustainable livelihoods, and contribute to the long-term goal, outlined in Vision 2025, of sustained economic growth.

This strategy is guiding the development process of the mechanization sub-sector in contributing to the national development aspirations of poverty reduction and economic growth. The strategy puts up mechanization interventions that aim to increase profitability of agriculture and other investment in the supply, processing and marketing side. Specific to mechanization,

the strategy gave due emphasis to improving access and availability to mechanization inputs, commercialization of agriculture through mechanized farming. In the strategy document, emphasis was also given to promoting the development of post-harvest handling, processing, storage, marketing and rural-based agro-industries and enhancing farmers' access to technologies and services through better financing of agricultural mechanization and improving further the policy, legal and regulatory environment for agricultural mechanization.

3.12. Kilimo Kwanza (Agriculture the priority) - 2009

Kilimo Kwanza is a slogan put by the Tanzanian government to establish agriculture as a top priority across all government ministries where the strategy calls for action by all stakeholders on a set of ten priority areas, to develop opportunities and reduce barriers to Growth in Tanzania's Agriculture Sector.

The global food price crisis of 2008/09 gave rise to renewed interest on the agriculture sector by both continental leaders under the African Union framework and the International Community. The government successfully launched plans for the active engagement of the private sector, and in mainstreaming agriculture in all sectorial undertakings emphasizing the importance of “*Kilimo Kwanza*” meaning “agriculture first”. Internationally, the country got support from the G8 to mobilize international private sector capital and technology transfer in support of revamping the agriculture sector. Most initiatives were designed to enhance technology uptake (e.g. seeds and fertilizer), market development and export promotion. Government, Development Partners and Private Sector agreed to adopt a cluster approach to optimize human and financial resources in attaining maximum impact at the shortest time possible. The Southern Agricultural Growth Corridor of Tanzania (SAGCOT) is among the first programmes under this approach, where partnership between government, small scale farmers and large scale commercial farmers/processors is emphasized. These developments channelled plenty of support for parallel programmes/projects for the implementation of ASDS outside of ASDP, some of them being mainstreamed later on into ASDP. Thus ASDP funding accounted for only a half of public investment in the sector and did not account for the contribution by the private sector.

3.13. National Agriculture Policy (2013)

Farm machinery, implements and equipment are important tools for productivity enhancement. Despite its importance, the utilization of farm machinery and implements in the country is very low with about 64 percent of farmers using the hand hoe, 24 percent draught animal power and 12 percent tractors.

The objective of the policy is to efficiently promote utilization of farm machinery, implements, equipment and agro-processing machines.

Policy Statements

- a. Conducive environment for private sector participation in agricultural mechanization shall be improved;
- b. Efficient utilization of agricultural machinery, implements, equipment and tools shall be promoted, particularly among women and men farmers;
- c. Utilization of agro-mechanization packages and mechanical technologies to local conditions shall be promoted;
- d. Quality of agricultural machinery, implements, equipment and tools shall be regulated and quality standards enforced;
- e. In collaboration with private sector, provision of training programmes for different levels on farm machinery, processing machines facilities and after-sale services shall be strengthened.

However, the use of modern farm machinery is hindered by high costs of agricultural machinery and implements and low purchasing power of most farmers; insufficient comprehensive agro-mechanization packages and non-compatibility of mechanical technologies to local conditions; inadequate quality control mechanism for agricultural machinery and implements; and inadequate trained operators, mechanics and insufficient after-sale services to agricultural machinery and implements. The National Agricultural Policy aimed at developing efficient, competitive and profitable agricultural industry that contributes to the improvement of the livelihoods of Tanzanians and attainment of broad-based economic growth and poverty alleviation. The policy explicitly stated its objective of strengthening agricultural support and technical services that comprise research, mechanization, irrigation, extension and trainings.

Specific to agricultural mechanization,

The policy document states the need for better policy on efficient utilization of farm machinery, implements, equipment and agro-processing machines promoted. The policy also states the need for creating conducive environment for private sector participation in agricultural mechanization. The policy also encourages efficient utilization of agricultural machinery, implements, equipment and tools and their promotion, particularly among women and men farmers. The policy also gives a direction towards the promotion and utilization of agro-mechanization packages and mechanical technologies to local conditions. Due emphasis has also been given to the enforcement of regulatory and quality standards set on agricultural machinery, implements, equipment and tools imported/manufactured and strengthening the provision of trainings for different levels of farm machinery, processing machines facilities and after-sale services.

3.14. Other Policies in Support to Agriculture

Other policies and strategies in support to agriculture include:

- i. The Rural Development Strategy (2001), which focuses on stimulating economic growth and reducing poverty in the rural areas.
- ii. Sustainable Industrial Development Policy (1996), which places emphasis on the promotion of small and medium industries, encouraging informal sector businesses to grow and formalize and in particular indigenous entrepreneurs, women, youth and people with disabilities.
- iii. National Micro Finance Policy (2000), which aims at establishing a basis for the development of a micro-finance system that will serve low-income households, smallholder farmers, and small and micro enterprises.
- iv. SME Development Policy (2003), which aims at increasing the contribution of Small and Medium Enterprises (SMEs) to the Gross National Product and export earnings as it recognizes that the SME sector has the potential in creating jobs and contributing towards economic growth. SMEs currently contribute 35% to GDP and 20 % of the total labor force.
- v. Land Policy (1995), which provides for a stronger local control of land resources, especially by the villagers and establishes the basis of a more effective land market.

- vi. Cooperative Development Policy (1997), which provides a framework for the restructured cooperatives to operate on the basis of independent, voluntary and economically viable principles.
- vii. Local Government Reform Programme (1998), which aims at decentralization intended at improving the delivery of quality services to the public. The reform program includes devolution of roles and authority by the Central Government by transferring political, financial and development planning authority to the Local Government Authorities (LGAs). The Central Government Institutions are left with the role of facilitation and supporting the LGAs in service delivery, policy formulation, and development

4. Regular and Quality Standard Checks

In Tanzania There are two main institutions in the country entrusted with testing and enforcing standards of agricultural machinery. The Centre for Agricultural Mechanization and Rural Technology (CAMARTEC) is mandated to test agricultural machinery to determine their suitability to the local conditions. CAMARTEC undertakes mainly field testing activities by assessing the performance of the machine or implement in working conditions typical of those for which it is offered for sale.

The Tanzania Bureau of Standards (TBS) develops standards for different items and has been more active in developing standards for industrial products. The aim of developing these standards is to provide customers with an assurance of reliable products with good service life. Developed standards related to agricultural machinery include those for hand hoes, machetes, animal drawn ploughs, 3-point linkages, power take off and hydraulic systems for tractors.

Generally testing and regulatory activities on agricultural machinery in the country have been weak despite of the law requiring all imported or locally manufactured machinery to undergo testing. With the liberalized trade and increase in importation of various commodities, mandatory testing becomes even much more difficult. The main purpose of this mandatory testing is to prevent the importation of equipment which is not suitable to the local conditions, thus protecting the consumer and to protect the local industry from unwelcome competition of similar products.

The institutions involved in testing and setting standards are constrained by limited laboratory and testing equipment, inadequate trained personnel and poor financing. Similarly, local manufacturing is hampered by high steel prices, non-availability or shortages of quality raw materials, poor production or processing systems and limited skilled workforce which makes it difficult to turn quality products conforming to standards.

In general, machinery importers ensure their suppliers are conversant with import quality requirements and that their consignments are accompanied with a Certificate of Conformity (CoC) from the appointed TBS Service Providers.

4.1. Tariffs and subsidies on agricultural machinery import

Tariffs levied on imported goods are one source of government revenue but they increase import costs and final prices paid by buyers of imported items. As most farm machineries used in Tanzania are imported from abroad, the Tanzanian government has waived import tariffs on most agricultural machineries to reduce machinery costs and make them affordable to the final buyers. However, there are still taxes on machinery spare parts and fuel used for operations.

With the aim of supporting smallholder agriculture, the government of Tanzania subsidized importation of power tillers (two wheel tractors) to make them affordable for those owning and providing farm operation services. Subsidy initiative carried out under Agricultural Sector Development Strategy (ASDS, 2001) created profitable market for the dealers, and distributors of farm machinery especially power tiller sub-sector. It also encouraged establishment of farm machinery hiring services at region level, district and farm levels. Through this program, groups and individual farmers at farm level especially smallholder farmers managed to own power tillers and its implements. The strategy also helped in enhancing farm machinery supply chain- from dealers to individual farmers at farm level. Empowerment of individuals in terms of entrepreneurship hence farm machinery hired business development. Figure 1 shows the rapid increase in importation of power tillers during 2009 and 2010 immediately after the government's initiative to enhance smallholder agriculture under *Kilimo Kwanza*.

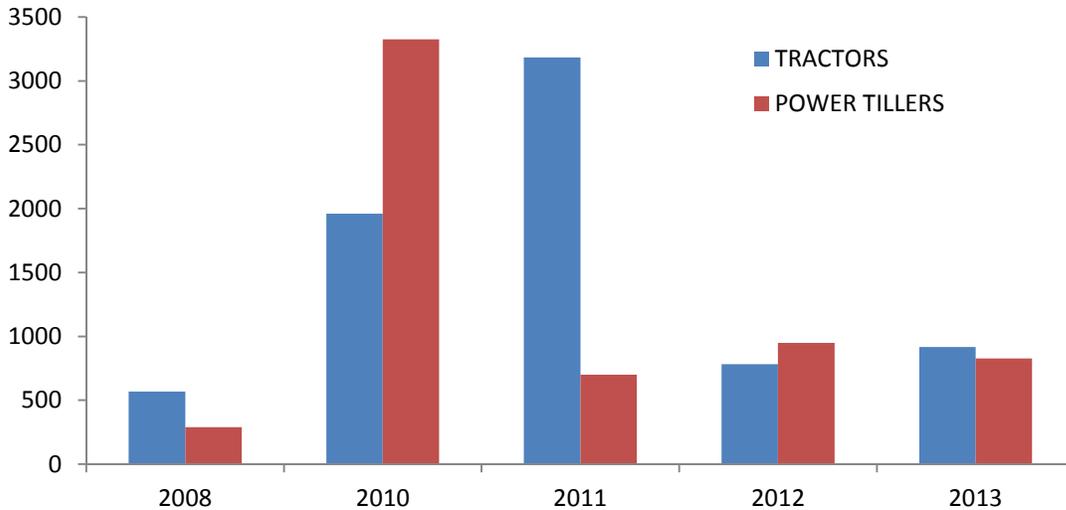


Figure:1. Farm-Power timeline in Mvomero Community-Tanzania.
Source: Bishop-Sambook, (2005:p.9)]

4.2. Policies Affecting Domestic Machinery Trade and Services

In addition to facilitating machinery imports, government shall put directives and take all relevant measures to ensure that the imported machineries are transferred to the end users or end users get the necessary services. For this, government polices need to create conducive business environment for machinery trade and facilitate access to credit services to farmers and farmer groups interested in investing in agricultural machineries. Accordingly, the Tanzanian government has established an agricultural window at **Tanzania Agricultural Development Bank (TADB)** for the purpose of supporting farmers (large and medium farmers and service providers) to access investment fund in agriculture sector. The Government also established a line of credit to allow the National Service Corporation Sole Agri-Machinery Project (SUMA JKT) (government owned) a Military Agricultural Dealer) to import or purchase farm machinery both 2WTs and 4WTs with the aim of facilitating the transfer of farm machineries to Tanzanian farmers.

4.3. Incentives for domestic production of farm machinery and implements

In Tanzania, most agricultural machineries are imported from abroad. But the government has been supporting mechanization workshop at the Center for Agricultural Mechanization and Rural

Technology (CAMARTEC) that does some re-designing and modifications to adapt farm implements to local conditions. There are also few local companies manufacturing farm implement such as rippers and sub-soilers. Nandra Engineering Company Limited, SEAZ Agricultural Equipment Limited (from Soweto industrial area in Mbeya), Intermech Engineering Company Limited (Kihonda industrial area in Morogoro) are among the few companies manufacturing farm implements (Mkoga, 2010).

4.4. How Policies affecting the demand and supply side

The government developed subsidy initiative that carried out under Agricultural Sector Development Program (ASDP). Direct beneficiaries of these subsidies are smallholder farmers and indirect beneficiaries are district councils through increased revenues collected from farm machinery business and 20 percent contribution from farmer groups.

This approach affected the overall supply chain as follows:

- ✚ Created profitable market for the dealers and distributors of farm machinery especially power tiller sub-sector.
- ✚ Encouraged establishment of farm machinery hiring services at region level, district and farm levels
- ✚ Groups and Individual farmers at farm level especially smallholder farmers managed to own power tillers and its implements.
- ✚ Increased farm machinery supply chain-from dealers to individual farmers at farm level
Induced technology in groups
- ✚ Empowerment of individuals in term of entrepreneurship hence farm machinery hired business development.
- ✚ Increased income at market and supply side
- ✚ Dealers increase sales
- ✚ In the same procedure, few farmers and farmer groups were assisted to own large tractors, processing machines, harvesting machines, irrigation equipment and C.A equipment and tools through DADPs, AGITF, DASIP, PADEP, TIB and now TADB.

5. Policy interactions and their aggregated effects on small mechanization

Summary of National Policies Affecting the Expansion of Agricultural Mechanization

<i>Policy areas affecting agricultural mechanization expansion</i>	<i>Does it exist? Yes/No</i>	<i>Elements encouraging small mechanization as stated in the policy (specify how)</i>	<i>Elements discouraging small mechanization expansion as stated in the policy (specify how)</i>	<i>What element(s) is (are) missing?</i>
National Agriculture Policy 2013	Yes	<ul style="list-style-type: none"> ○ Efficient utilization of farm machinery, implements, equipment and ○ Agro-processing and renewable energy machines sources underutilization. 	<ul style="list-style-type: none"> ○ High costs of agricultural machinery and implements and 	<ul style="list-style-type: none"> ○ Insufficient comprehensive agro-mechanization packages and non-compatibility of mechanical technologies to local conditions. ○ Low utilization of farm machinery and implements, low level of using other renewable energy and small sources of power machines. ○ Low purchasing power of most farmers; ○ Inadequate quality control mechanism for agricultural machinery and implements; and

				<ul style="list-style-type: none"> ○ Inadequate trained operators, mechanics and insufficient after-sale services to agricultural machinery and implements.
<p>Mechanization policy/Strategy</p> <p>(TAMS Strategic areas)</p>	Yes	<ul style="list-style-type: none"> ○ Commercialization of agriculture through mechanized farming ○ Improve dissemination of mechanization technologies to enhance up-take ○ Promotion of alternate technologies such as power tillers ○ Quality control and product testing ○ Private sector to establish and manage tractor-hiring services centers ○ Improve Access and Availability to Mechanization Inputs 	<ul style="list-style-type: none"> ○ Training of Animal Traction Technologies ○ High costs of product testing ○ Smallholder farmer unable to access to credit ○ Focus highly only on 4W tractor 	<ul style="list-style-type: none"> ○ Train oxen users the benefit of using small mech. ○ Reduce the risk of climate variability/unreliable rainfall ○ Use of agricultural machinery to off farm activities such as transportation, city cleaning activities. ○ Suitable machinery packages for main agricultural operations ○ Train 2WT-operators ○ Road license of 2WTs ○ Driving license to 2WT operators.
<p>Agricultural intensification</p> <p>(ASDS,</p>	Yes	<ul style="list-style-type: none"> ○ Technology multiplication and dissemination ○ Machinery and equipment hire 	<ul style="list-style-type: none"> ○ Emphasis on Draught animals 	<ul style="list-style-type: none"> ○ Poor phase out strategy by delegating much power to private sector.

<p>Tanzania Development Vision 2025, NSGRP, Kilimo Kwanza, and ASDP)</p>		<p>services to smallholder farmers</p> <ul style="list-style-type: none"> ○ Commercialising smallholder agriculture through mechanization ○ Agro-processing and Agribusiness. ○ Increasing access to rural micro-financial ○ Support research in CA and provides inputs for CA ○ Private sector involvement 		<ul style="list-style-type: none"> ○ Purchasing power of most small scale farmers ○ Strengthening 2 WTs based CA
<p>Livestock Policy (intensification)</p>	<p>Yes</p>	<ul style="list-style-type: none"> ○ Commercialization Mechanization 	<ul style="list-style-type: none"> ○ Draft animal power 	<ul style="list-style-type: none"> ○ Repurpose of Oxenization Training Centers (OTC) along with is to train on small machines. ○ Reduction of use of animal draft power ○ Emphasize more on smallholder dairy and beef production for income generation – 2 WTs can substitute animal draft power
<p>Labor productivity vs displacement</p>	<p>Yes</p>	<ul style="list-style-type: none"> ○ Labor union ○ Private Sector provides machinery and equipment hire services to smallholder farmers. ○ Recognizes that SME sector has 	<ul style="list-style-type: none"> ○ Urban Youth Migration ○ Lacking youth strategy in agriculture 	<ul style="list-style-type: none"> ○ Use of small mechanization to improve labor productivity

		<p>the potential in creating jobs and contributing towards economic growth</p> <ul style="list-style-type: none"> ○ Rising of the minimum wages 		<ul style="list-style-type: none"> ○ Off farm employment opportunities
Energy Policy (relative to labor market)	Yes	<ul style="list-style-type: none"> ○ Rural electrification, and use of renewable natural resources ○ Giving the private sector appropriate incentives to develop technologies 	Poor rural Infrastructure	<ul style="list-style-type: none"> ○ Use of small mechanization combined with CA to reduce energy use in agriculture
Land policy (ownership, tenure, etc)	Yes	<ul style="list-style-type: none"> ○ Improving Livelihoods and Land Management through Conservation Agriculture ○ Integrated and sustainable utilization of agricultural lands ○ legal and physical access to land and use to land titles as collateral for loan ○ Provides for a stronger local control of land resources, and establishes the basis of a more effective land market. 	<ul style="list-style-type: none"> ○ Introduction of land taxes ○ Cost of land valuation and survey is high ○ Long time process in securing collaterals ○ Most of the arable land is owned by old farmers ○ Youth – energetic – don't have easy access to land 	<ul style="list-style-type: none"> ○ Security for small-scale farmers to be able to borrow loans, equipment ○ Establishment secure land transaction system ○ Collaboration between MAFC and MLHHS in Agriculture Land. ○ National agricultural Youth Strategy
Import policy (taxes, subsidies)	Yes	<ul style="list-style-type: none"> ○ Improving policy, legal and regulatory environment for agricultural mechanization ○ Exemption taxes on agricultural machinery and implements 	<ul style="list-style-type: none"> ○ Importation of tools, equipment and machinery of poor quality. ○ Taxes on spare parts and VAT in the provision of 	<ul style="list-style-type: none"> ○ Free importation of agricultural machinery spares and materials. ○ Strong Testing and regulatory activities

		<ul style="list-style-type: none"> ○ Farmers has access to a wide choice of farm machinery and implements 	<ul style="list-style-type: none"> services like tractor hire ○ Absence of Mechanization Law 	<ul style="list-style-type: none"> ○ Weak after sales services ○ Short working life of farm machinery
Industrial Policy (incentives for local manufacturing , absorbing labor to industrial sector)	Yes	<ul style="list-style-type: none"> ○ promotion of small and medium industries, and encouraging informal sector businesses to grow ○ Increase usage of farm machinery ○ Promote local manufacture of agro-processing machinery and equipment. ○ Build capacity of manufacturers and distributors for supply of CA inputs. 	<ul style="list-style-type: none"> ○ Public involvement on industries i.e., SUMA JKT 	<ul style="list-style-type: none"> ○ General technical know how ○ development of local industries for the production of machinery and implements, ○ Rising of real wages
Subsidies on machinery (with view of phasing them out)	Yes	<ul style="list-style-type: none"> ○ Access and availability of mechanization inputs ○ Strengthen the capacity of various informal private sector players ○ Waive tax on farm mechanization ○ Provision of Loans for the purchase of new tractors and rehabilitation of old tractors 	<ul style="list-style-type: none"> ○ Lack of well-trained operators and mechanics to operate and maintain and repair agricultural machinery ○ When projects / programs phase out the price increases and the smallholder farmer fails to meet. 	<ul style="list-style-type: none"> ○ To have close monitoring the sustainability of implemented projects before phase out.
Research, extension, development	Yes	<ul style="list-style-type: none"> ○ Strengthen agricultural support and technical services. ○ Development of appropriate smallholder agricultural mechanization and agro-processing technologies 	<ul style="list-style-type: none"> ○ Inadequate financing; ○ limited laboratory and testing equipment; ○ lack of transport and limited human capacity skills ○ Weak linkages in the R & D 	<ul style="list-style-type: none"> ○ Research on agricultural mechanization ○ Training and extension covering agricultural mechanization.

		<ul style="list-style-type: none"> ○ Dissemination of mechanization technologies to enhance up-take ○ Financing of research at public and private institutions ○ Private Sector involvement to develop agro-industries in the rural areas ○ Use of technology-incubator 	system	<ul style="list-style-type: none"> ○ Establish and upgrade training facilities ○ Vocational training ○ Creation of Regional networks on agricultural mechanization ○ Replacement and decrease of mechanization officers in LGAs
Environmental policy	Yes	<ul style="list-style-type: none"> ○ Sustainable agriculture especially Conservation Agriculture ○ Enforce environmental laws and regulations ○ Efficient use of renewable natural resources shall be strengthened 	<ul style="list-style-type: none"> ○ Land use management and soil degradation ○ Inadequate irrigation and water harvesting strategies ○ Poorly infrastructure of irrigation scheme including leveling and farm roads ○ Local Manufacturing and poor availability of CA tools and equipment 	<ul style="list-style-type: none"> ○ More emphasis on CA is needed due to effects of mitigate climate change which reduces production
Business environment (PPP, etc.)	Yes	<ul style="list-style-type: none"> ○ Attract local and foreign investors to engage in production, importation and supply of agricultural machinery through review the Govt. ○ Commercialization of agriculture through mechanized farming ○ Globalization and free market 	<ul style="list-style-type: none"> ○ High cost of agricultural machinery ○ Low business volume resulting to poor cash flow due to the seasonality of demand of agricultural machinery and implements ○ Inadequate business and 	<ul style="list-style-type: none"> ○ Technical support and business advisory services ○ Support the development of partnerships and alliances ○ Establishment of market information system

		trade	technical knowledge in relation to agricultural machinery	
Regulation and enforcement (mobility, quality etc)	Yes	<ul style="list-style-type: none"> ○ Improving Policy, Legal and Regulatory Environment for Agricultural Mechanization ○ Standardization and testing through institution like TBS and CAMARTEC 	<ul style="list-style-type: none"> ○ Lack of regulation which guide mobility of small mechanization and its implements (under construction) 	<ul style="list-style-type: none"> ○ Harmonized regulations ○ Speed up the implementation of agreed policy of registering and legalize small engine use of road
Infrastructure (national and local roads, electricity, etc)	Yes	<ul style="list-style-type: none"> ○ Rural road networks for improved agricultural development ○ Availability and accessibility to rural electrification through REA, water, communication, transport services and market infrastructure 	<ul style="list-style-type: none"> ○ Poor state or lack of rural infrastructure 	<ul style="list-style-type: none"> ○ Standards and Quality of rural roads
Finance, credit, insurance	Yes	<ul style="list-style-type: none"> ○ Development of a micro-finance system that will serve low-income households, smallholder farmers, and small and micro enterprises ○ Credit Guarantee Schemes; agricultural window at Tanzania Agricultural Development Bank (TADB) for the purpose of supporting farmers (large and medium farmers and service providers) 	<ul style="list-style-type: none"> ○ Inadequate capital due to lack of trade financing ○ Long term loans to finance production need collateral which is often lacking to smallholder farmers ○ The loans provided is too small for farmer to acquire agricultural machinery and implements especially engine powered ones 	<ul style="list-style-type: none"> ○ Credit targeting small scale farmers. ○ Establishing credit guarantees to smallholder scale

		<ul style="list-style-type: none"> ○ Purchasing of new farming techniques and technologies as well as to assist in acquiring access to essential farm inputs. ○ Financial Regulations, business licensing procedures, by-laws with impact on mechanization 	<ul style="list-style-type: none"> ○ Unreliable and Weak farmer groups/ associations 	
Pricing policy on agricultural commodities	Yes	<ul style="list-style-type: none"> ○ Promotes creation of marketing authorities-minimum guaranteed price which incentivize farmers ○ Removed border trade barrier 	<ul style="list-style-type: none"> ○ Weak agro-industries and poor linkages within the marketing, processing and production chains ○ Setting of price of major commodities ○ Low producer prices ○ Failure by marketing authorities to guarantee profitable producer prices ○ Lack of marketing division in MAFC 	<ul style="list-style-type: none"> ○ Create multiple marketing options ○ Improve access to market information ○ Complete liberalization and good regulation of food markets ○ No incentive for small-scale farmer investment in small-scale mechanization ○ Weak coordination between MAFC and MITM

6. Conclusions and Implications

The level of agricultural mechanization in a given country is directly influenced by the diverse policies related to agricultural and industrial development and strategies formulated in achieving the stated goals under these policies. This paper synthesized trade, agriculture and mechanization related policies and documented their direct and indirect effects on the expansion and development of agricultural mechanization in Tanzania. Major findings of this policy review are presented below.

Government policies encouraging the expansion of agricultural mechanization shall focus on public-private partnership where the public sector creates conducive business environment for the private sector to address mechanization demand through adequate supply of farm machineries and implements. Government based subsidized mechanization program may increase the availability of agricultural machineries but sustainability of a subsidized supply system is rather questionable.

As smallholder farmers may not have the financial capacity to purchase tractors, the visible arrangement for better agricultural mechanization in smallholder farming has to be a hire service to any of the farm and non-farm operations farmers are willing to pay with the aim of reducing labor drudgery and/or enhancing farm productivity. In this regard, strategies that enhance farm household income and their ability to pay for machinery service and policies that encourage and support the existence of adequate number of trained mechanics, machinery operators, and well organized after-sale services need to be in place.

Different locations have different soil type, landscape, cropping systems and other factors influencing use of agricultural mechanization. Thus, compatibility of mechanical technologies to local conditions and proper mechanization packages could play crucial role in enhancing demand for mechanization use by smallholder farmers. Thus, strategies designed to enhance smallholder farm mechanization shall take diversities of farming systems into consideration.

Generally, the Tanzanian Government has put much effort in formulating policies and designing mechanization strategies to enhance the level of agricultural machinery use in smallholder farming in the country. The number of tractor importation has increased, and through state supported arrangements, transfer of these tractors to end users/service providers was facilitated.

Through these efforts that the government has put in place, agricultural mechanization in Tanzania is taking shape in all dimensions.

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