Development of Agricultural Mechanization in Ethiopia and the Role of National Policies

[FACASI Project, Activity 3.1.2]

Summary

Though Ethiopia has a long history of agricultural practices, the development of agricultural mechanization is still minimal. Farm power is mainly dependent on oxen-draft and human muscle operating using traditional farm implements. Oxen-pulled *maresha* is the dominant farm implement in cereal-based systems whereas hand-hoe is the main farm implement used in agroforestry systems. The level of tractor-based agricultural machinery use is relatively better in wheat dominated cropping systems where harvesting and threshing are done using combiners. During the last three governments, different levels of emphasis were given to agricultural mechanization. During the Emperor's time (pre-1974), more emphasis was given to mechanizing large and commercial private farms and, during the later stage (i.e., in 1960s), through different Agricultural Development Units, attempts were made to develop and promote different agricultural technologies (including farm implements) that fit to smallholder farmers. The Dergue government gave more attention to mechanizing state owned large farms and mechanization support to the emerging smallholder producers' cooperatives in cereal-based systems. In collaboration with the former Union of Soviet Socialist Republic, the Dergue government established Nazareth Tractor Assembly plant, which was a breakthrough in agricultural mechanization in the country. Currently, the government is supporting both imports of machineries and the development of domestic machinery manufacturing plants producing/assembling tractors, implements, water pumps, etc. Recently, there are also attempts in designing a comprehensive agricultural mechanization strategy for all levels of farm size. However, the strategy is ahead of the lacking explicit agricultural mechanization policy in the country.

Acronyms

ADLI	Agricultural development-Led Industrialization
AMSE	Agricultural Mechanization Service Enterprise
ATA	Agricultural Transformation Agency
ARARI	Amhara Region Agricultural Research Institute
CADU	Chilalo Agricultural Development Unit
EIAR	Ethiopian Institute of Agriculture
ENAMS	Ethiopian National Agricultural Mechanization Strategy
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
MoA	Ministry of Agriculture
MoFED	Ministry of Finance and Economic Development
NTAP	Nazareth Tractor Assembly Plant
OARI	Oromia Agricultural Research Institute
PASDEP	Plan for Accelerated and Sustainable Development to End Poverty
SDPRP	Sustainable Development and Poverty Reduction Program
TARI	Tigray Agricultural Research Institute
USSR	Union of Soviet Socialist Republic
WADU	Wolaita Agricultural Development Unit

Table of Contents

1. Introduction

Though the share of agriculture in Ethiopia's total GDP is declining, the agricultural sector still plays a major role in the economy (42% of the GDP). The sector is a main source of employment for 80-85% of the labor force. Close to 15 million rural farm families are directly depending on agriculture for their livelihood and operating a total crop area of 13.5 million ha mainly under rain-fed system. Agriculture is mostly smallholder based where about 90% of the farmers own less or equal to 2 ha per household. In addition to human muscle, in most cases and particularly in cereal based systems, oxen-draft is the main source of farm power for land preparation and planting. In agroforestry systems, where hand-hoe is the dominant farm implement, human muscles are used for all farm operations. In wheat-based systems of Arsi and Bale highlands, wheat harvesting and threshing are mainly done using combine harvesters. Smallholder farmers in these areas are relatively better in terms of agricultural mechanization level.

Looking into the history of agricultural mechanization in Ethiopia, technology development in line of agricultural mechanization and farm implement were not in place till the late 1950s where the Jimma Agricultural Technical School introduced mule-pulled ploughs for tillage practices. This was followed by additional efforts made by Chilalo Agricultural Development Unit (CADU) and Wolaita Agricultural Development Unit (WADU) and Ministry of Agriculture in adapting these ploughs to these specific locations through the development units established at these specific locations (ENAMS, 2014-Draft document). In recognition to the need for agricultural mechanization development, the first higher learning level curriculum on agricultural mechanization program was started in 1958 at the Alemaya College of Agriculture Mechanization and Art (now known as Haramaya University). Later, this was capacitated to train students at First degree level under the Department of Agricultural Engineering. In 1990s Awassa College of Agriculture also opened the Department of Agricultural Engineering and Mechanization to train students at diploma and degree level. In most cases, these learning institutes are criticized for focusing on large-scale and capital intensive mechanization and ignoring the actual situation on the ground where more than 95% of the farm produce is coming from smallholders operating on less than 2 ha and using traditional implements.

In 1976, agricultural mechanization research unit (known then as Agricultural Implements Research and Improvement Center) was hosted in Melkasa Agricultural Research Center. The research unit is still at Melkasa and working and testing different farm implements for tillage, planting, threshing and storage. Gradually, mechanization research continued getting better attention and the agricultural mechanization research directorate was established in 2000 at the Ethiopian Institute of Agricultural Research (EIAR). Following the establishment of mechanization Directorate at EIAR (which is a Federal level research institute), Three Regional Agricultural Research Institutes (Oromia, Amhara and Tigray) also established a parallel structure to own mechanization research programs. The mechanization centers at different regional research institutes have different naming: Bahir Dar Mechanization and Food Science

Research Center (at ARARI), Mekele Mechanization and Rural Energy Research (at TARI), Asella, Bako, Jimma and Fedis Agricultural Mechanization Research Centers (at OARI). Though limited in number, there are also private agricultural mechanization centers that contributed to the development of agricultural mechanization in Ethiopia. Selam Vocational Training Centers is a good example in this regard.

Since 2002, there have been three principal development programs set by the Ethiopian Government. These programs are: First, the Sustainable Development and Poverty Reduction Program (SDPRP) designed for three years, 2002/03-2004/05, and have four pillars where Agricultural Development-Led Industrialization (ADLI) was the core one. Second, the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) designed five years, 2005/06-2009/10, and with eight pillars where agricultural commercialization was a strong pillar. Third, the Growth and Transformation Plan (GTP-1), designed for five years, 2010/11-2014/15, and currently in its last year of implementation. GTP-1 has seven pillars where the major pillar is known for maintaining agriculture as a major source of economic growth. In all the three plans/programs mentioned above, enhancing agricultural production and productivity through use of modern agricultural technologies is the fundamental direction the government put. In support of this, the government also allocated more than 10% of its budget to agricultural development. However, like improved seed and fertilizer use, agricultural mechanization and its development plan have not been given due attention in these plans/programs. The existence of such a policy and strategy gap could be a good indication for the slow expansion and development of agricultural mechanization in the country.

Thus, the main purpose of this document is to review agricultural mechanization related national policies and strategies and their role in the development of agricultural mechanization in Ethiopia. The remaining parts of this document are structured as follows. Section 2 gives analytical framework. Section 3 presents national agricultural development plans under three governments and review the level of attention given to agricultural mechanization in these plans/programs. Section 4 discusses the recently developed mechanization strategy and existing challenges in the area of agricultural mechanization in the country. Section 5 concludes the review.

2. Analytical Framework

In this review document, we follow three distinct time lines: before 1974 (i.e., Emperor's time), between 1974- and 1991 (Dergue government) and since 1991 (current government). These three governments have distinct economic set-ups and views on agriculture. The Emperors era was a feudal system where smallholder farmers have limited use-right on land under the good-will of the landlords. In the Dergue time, smallholder farmers were entitled to land but most of the development activities are centrally planned under command economy. In the current government system, both the public and private systems are engaged in the agricultural technology supply system and the markets are relatively liberal.

On the other hand, the analysis also tries to see the effects of national policies and strategies on the development of agricultural mechanization at three tiers: (1) cross-border importation of finished farm machineries/implements and/or spare parts; (2) domestic manufacturing of farm machineries, implements and the overall distribution of agricultural machineries, and finally, (3) the utilization of these machineries and farm implements at a farm level.

Though there is no direct policy document on agricultural mechanization, this review looks at the different agricultural development plans designed and implemented during the above indicated three periods and the level of attention paid to the need for agricultural mechanization development to drive growth in the agricultural sector.

3. Agricultural Development Plans and Mechanization Issues Addressed

In this section, we review agricultural development plans under three subsequent governments in Ethiopia and discuss how the agricultural mechanization development issues were addressed in these plans/programs.

3.1. Emperor's Era

During the Emperor's era, agricultural development was not given due attention till the country was shaken by food shortage in the 1950s, the remarkable period food importation has started for the first time. With the aim of boosting domestic agricultural production, different agricultural development strategies started coming to existence during late 1950s and early 1960s. These development strategies were paying much attention to supporting medium to large scale capital-intensive private farms mainly producing cereals, mainly wheat (Cohen, 1987). One of the strategies designed was to develop and test agricultural technologies using agricultural development units established at different locations and promote these technologies using extension systems. With the support from Swedish International Development Agency (SIDA), the first two development units came to existence in 1960s were the Chilalo Agricultural Development Unit (CADU) and Wolaita Agricultural Development Unit (WADU). In addition to improved seed and chemical fertilizer use, CADU and WADU were also demonstrating agricultural mechanization use. In addition, the government also designed an extension system under the Minimum Package Program (MPP) that mainly focused on enhancing smallholder farmers' access to a package of improved technologies in the regions of WADU and CADU.

In 1970s, the Emperor's government developed policies that provide large-scale private commercial farms the privileges to import duty-free farm machinery and parts, access to credit and foreign exchange for buying such equipment with government subsidized loans at 7%, and fuel tax waivers (Cohen, 1987). According to Cohen (1987) such a huge support to private farms increased profit margins of mechanized cereal production and a number of land-owners around Chilalo wheat-based system evicted smallholder tenants using draft animal power and traditional *maresha*. However, this didn't last long as the revolution took place in 1974 and large private

3.2. Dergue Government

When the Dergue came to power, there were handful private farms with better level of mechanization in place. Due to the socialist ideology, the government appropriated private farms with all their properties and put them under state farm. The government kept supporting the state farm through supplying them with better machineries. To maintain the level of agricultural mechanization in large state farms and make them sustainable, under the technical and economic collaboration agreement with the then Union of Soviet Socialist Republic (USSR), the Dergue government established Nazareth Tractor Assembling Plant in 1984. The plant was assembling tractors using tractor parts imported from socialist countries including USSR. The tractors and their implements assembled at NTAP were sold to state farms and donated to prominent smallholder producer's cooperatives established in cereal based systems. Due to poor management and lack of know-how in machinery operation and maintenance, machineries provided to the producers' cooperatives didn't last long and all cooperatives were abolished starting the mixed-economy proclamation in 1990 and ended with the over-though of the Dergue government.

During the later years of its rule, the Dergue government proclaimed mixed economy that allows private sector to own capitals worth more than 500,000 ETB (by then equivalent to 250,000 USD). Though Dergue ruled only for one year after this proclamation (1990), it was a good initiative to encourage business people to go for large scale mechanized farms.

Except transferring land from the feudal system to the tillers on use-right basis, no attention was given to the development of farm implements and farm power smallholder farmers were using in crop production. In terms of agricultural mechanization, like the preceding government, the Dergue government was also favoring capital-intensive and large-scale state farms (Belete et al., 1991).

3.3. Current Government

During the current government, agricultural sector has got better attention and emphasis. The sector has got a recognition that the overall economic growth in the country depends on the performance of this sector. Accordingly, a number of agricultural development strategies and plans have been formulated and implemented. As the major contribution of agriculture comes from smallholder farmers, the government put a clear agricultural development strategy focusing on enhancing technology generation and use by smallholder farmers to close the productivity gap in major crops. However, smallholder agricultural mechanization hasn't got equal attention to other yield improving inputs/technologies like improved seeds and fertilizers.

In 1992, the tractor assembling plant established during the preceding government was renamed as Adama Agricultural Machinery Industry (AAMI). In 2010, it was transferred to the Metals and Engineering Corporation (METEC) that manages a number of sister industries. AAMI assembles and manufactures tractors, water pumps and various agricultural combines and

products. Products from this corporation are used by government, farm unions, and state owned enterprises for agricultural, water irrigation, construction and transportation related projects (www.metec.gov.et). AAMI also trains tractor operators and tractor pulled implements.

In 2004, under regulation No. 97/2004, the Council of Ministers issued a regulation for the establishment of Agricultural Mechanization Service Enterprise (AMSE). The Enterprise was established with an initial capital of 20.5 Million Birr with multiple objectives to render agricultural mechanization services on rental basis, provide maintenance services on rental basis, sale farm implements and spare parts manufactured domestically or imported, provide transportation services to farm produce and farm inputs, introduce the utilization of modern farm implements by being the transmission belt of modern agricultural technology, provide training and consultation service on a better ad effective utilization of farm machineries in consideration. In addition to the government owned AMSE, there are also private companies importing agricultural machineries (combine harvesters, large and small tractors, farm implements, etc.) and providing rental services to smallholder farmers particularly in wheat based Arsi and Bale highlands.

4. Agricultural Mechanization Strategy

In the country, there was no clear agricultural mechanization strategy till the recent draft developed by the Ethiopian Agricultural Transformation Agency (ATA) and Ministry of Agriculture (MoA). The draft mechanization strategy is a comprehensive document that puts different agricultural mechanization options for different farm sizes. The draft document also frames agricultural mechanization strategy looking from value chain's perspective starting from designing machineries, importing machineries/spare parts, assembling, distribution, ownership, and after-sale services.

5. Discussions and Conclusions

With a special focus to the development and expansion of agricultural mechanization in Ethiopia, this document reviews the past and present national policies and strategies contributed to the existing level of agricultural mechanization development in the country. As there has not been clear agricultural mechanization policy over the last three governments, most of the mechanization related issues discussed above are extracted from agricultural development programs and strategies designed and implemented by the respective governments.

The review shows that there are discontinuities in the efforts made towards the development of agricultural mechanization in Ethiopia. Changes in government always came up with changes in policies and strategies guiding agricultural development and land tenure systems, which also influence the mechanization component of agricultural growth and development.

During the Emperor's era, agricultural mechanization strategies developed gave more privileges to capital-intensive commercial farms. Similarly, during the Dergue government, priority was given to mechanization of large scale state farms. The establishment of NTAP was mainly to support the mechanization wing of state farms. Only few producers' cooperatives had got the chance to own tractors and tractor-pulled farm implements.

The current government though still lacks a clear mechanization policy, has supported the state owned machinery assembling plant and formulated a regulation to establish Agricultural Mechanization Service Enterprise.

Recently, ATA and MoA are developing Agricultural Mechanization Strategy based on experience of different countries and stakeholder consultations. The draft strategy document is comprehensive and encompasses all levels of farm size and covers across along the whole value chain in agricultural machinery supply and use. Re-capacitating the agricultural mechanization research units to come up with machinery designs and prototypes that fit to smallholders' need and capacity to pay are important.

Currently, there is a challenge to the government due to the special treatment both agricultural machinery importers and machinery manufacturers (assemblers) are demanding. Domestic assemblers importing knocked-down spare parts request the government for import tax relief on spare parts or strong tax on importation of finished machinery products. On the other hand, machinery importers would like to have less import tariff on machineries, even they ask to the extent that they would get a tariff waiver like investors importing construction machineries. Balancing the two and looking into the short and long-term comparative advantages the two competitors have in the process of agricultural mechanization development seems crucial.

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