



Malawi 2063 Policy Brief Series

July 2022

AGRICULTURE MECHANIZATION IN MALAWI: EFFORTS, OBSTACLES, POLICY IMPLICATIONS AND OPTIONS



Context

Key messages

- Access and distribution of machinery and equipment play a central role in the development of agricultural mechanization.
- Limited access to mechanization, coupled with a narrow financial and technical capacity to mechanize, especially among smallholder farmers, undermines agricultural development in Malawi.
- Targeted policy approaches with which to address mechanization challenges in Malawi should include:
- Building a conducive policy and programmatic environment for private markets and service providers' participation in the provision of mechanization products and services.
- Fostering private-public partnerships in efforts aimed at enchaining Mechanization.
- Deepening investment in local technical capacity building in usage of mechanization services and products.
- Promoting usage of affordable agriculture mechanization equipment, services and products.

Agriculture mechanization involves economic application of engineering technology to increase labor efficiency, for higher productivity and commercialization of agriculture products and services (Daum et al, 2020). It covers all levels of farming and processing technologies, from simple and basic hand tools to more sophisticated and motorized equipment, applied in activities such as ploughing, harvesting, processing, and marketing of agriculture products. Within the broader focus of Agriculture Productivity and Commercialization as the first pillar of Malawi 2063 is promotion of mechanization in the agriculture sector towards a highly productive and commercialized agriculture sector (National Planning Commission, 2020). Evidence suggests that mechanization has a major effect on demand and supply of farm labor, agricultural profitability and a change in the rural development landscape (Peng, et al, 2022).

However, there is a dearth of research around agricultural mechanization in Malawi, especially on mechanization trends in the smallholder sector. That notwithstanding, empirical knowledge and evidence reveals lower utilization levels of engine power in land preparation, (most basic activity in agriculture production), across the sub-Saharan African region, compared to other regions in the world, as table 1 shows.

AGRICULTURE MECHANIZATION IN MALAWI: EFFORTS, OBSTACLES, POLICY IMPLICATIONS AND OPTIONS

Region	Human muscle power	Draught animal power	Engine power
Sub-Saharan Africa	65	25	10
East Asia	40	40	20
South Asia	30	30	40
Latin America & the Caribbean	25	25	50

Table 1: Percentage distribution of sources of power for land preparation in selected regions of the world (Source: FAO (2016))

In Malawi, apart from land, labor is a constraining factor for agricultural development, especially among small holder farmers. It is estimated that more than two thirds of farming power is predominantly sourced from human muscle, especially in crop cultivation (IFPRI, 2018), and when carrying out other activities such as value addition, processing, and transportation. Essentially, there is limited use of engine-powered machinery and animal traction in both down and upstream agriculture activities (Kahan et al, 2018).

Statistics on mechanization in Malawi’s agriculture sector remain scanty, capture few equipment and are not regularly updated. Malawi’s agriculture mechanization has remained low, estimated at 13% of its potential. For instance, the tractor-farmer ratio stands at 1:1,800, with an average tractors age of over fifteen years (FAO, 2016). Across countries in Africa, figure 1 shows Malawi’s levels of agriculture mechanization lagging below 10 percent, using 4-wheel tractor as proxy.

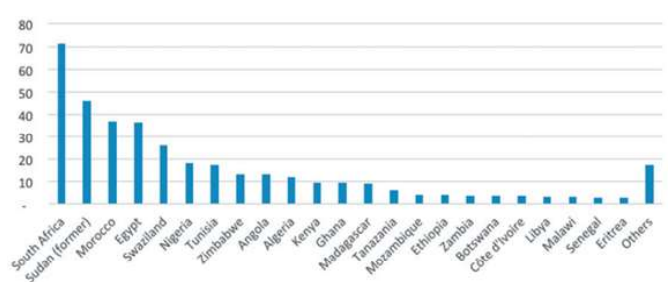


Figure 1. Percentage distribution of agriculture mechanization among selected African countries, based on 4-wheel tractor importation (Source: FAO 2016)

Among others factors, Malawi’s low agricultural mechanization is attributed to (i) thin markets that limit access to machinery and spare-parts supplies; (ii) missing institutions especially those that would be required to ensure adequate technicians and skilled personnel to operate and repair farm machinery; (iii) high initial capital requirements, coupled with long periods to realize economic returns; and (iv) governance challenges i.e., political interest, ineptness and corruption that constrain the government and hinder private sector’s involvement in machinery importation (Behrendt & Paparas 2020). Low agricultural mechanization in Malawi contributes to low crop productivity, increase levels of post-harvest losses (Cossar, 2019), since land preparation is difficult and labor-intensive, timely harvesting, quality primary processing, and storage of agriculture produce all get compromised in the absence of appropriate mechanization (Amadi, 2016).

However, increased mechanization can play a key role in unlocking underutilized agricultural potential in the country. The challenge is to develop institutional arrangements that enable smallholder farmers access mechanization services for higher crop and livestock production, post-harvest handling, storage and processing of agriculture produce. Key institutional interventions to address these limitations include addressing market governance issues, ensuring functional and effective government agencies involved in spearheading agriculture growth and enhancing effective governance in community-based organizations and cooperatives. These initiatives would facilitate smallholder farmers joint ownership of machinery for farm productivity (Meseret & Yuan-pei , 2021). This policy brief discusses efforts,

AGRICULTURE MECHANIZATION IN MALAWI: EFFORTS, OBSTACLES, POLICY IMPLICATIONS AND OPTIONS

obstacles and policy considerations for enhancing agriculture mechanization in Malawi.

Policy and Programme Efforts Towards Agriculture Mechanization in Malawi

Government has traditionally played a pivotal role in introducing new sources of farm power to communities, through providing information, developing the skills of operators, subsidizing inputs and credit, and supporting veterinary services. These activities have usually been linked to the promotion of cash crops. Recent support for farm power has been in parallel with initiatives to promote sustainable farming practices, such as reduced tillage and conservation agriculture. Some initiatives include distribution of 400 treadle pumps in the country's 193 constituencies in 2002-2003 (Mangisoni, 2006), and installing diesel and solar powered irrigation systems (2016).

The African Development Bank (AfDB) Group approved grants and loans amounting to US \$39.98 million from the Global Agriculture and Food Security Program (GAFSP) and the African Development Fund (ADF) to finance the Smallholder Irrigation and Value Addition Project (SIVAP) since 2014. As of 2018, the World Bank funded Programme, the Agriculture Commercialization (AGCOM) Programme worthy \$95 Million was introduced and has a focus area on farm mechanization in the programme.

The government of Malawi purchased 177 tractors with their accessories (ploughs, harrows, ridgers and trailers); 48 seed and fertilizer drilling machines; 144 maize shellers and 2,550 sprayers) in 2011 with the goal of boosting the operations of Tractor Hire scheme. These tractors would (have been) be available for hire by farmers in Malawi but the entire tractor hire scheme had minimal success since 2015.

While government has often acted as a catalyst in the drive to agriculture mechanization, the ability of the private sector to follow through these initiatives is essential, in terms of both the service sector and private purchases of animal draught power (ADP), pumps, and tractors by individuals and groups. Without a skilled and well-equipped supporting infrastructure, existing ADP and tractor owners could be vulnerable to the withdrawal of government support. Similarly, the absence of an enabling policy environment for

mechanization curtails initiatives by would-be adopters, given the weak state of agricultural profitability in the country.

Supporting the agriculture mechanization drive in the country through the supply of agricultural equipment albeit with private interest, private companies such as Farming and Engineering Services (FES) and CAMCO stepped in with various equipment which would assist farmers, from the production stage to the post-harvest stages of farm activities. The companies' focus is on the provision of tractors and heavy-duty machinery, targeting large-scale farmers and companies, who affords the cost of machinery. Smallholder farmers and cooperatives are not within the private interest as the prices of machinery are too high for their reach, and the companies barely takes the risk of covering smallholders farmers in the fold of the initiative.

However, through the National Agriculture Investment Plan (NAIP), government intended to increase usage of machinery in farming and aggro-processing along the value chain. The plan intended to facilitate imports and use of appropriate agricultural machinery meeting government standards and, creating an enabling environment for importing and local production of spare parts. In addition, the plan advocates for entrepreneurship under agricultural mechanization and services delivery and promote innovation. Through the NAIP, there was a target of increasing the use of machinery in farming and aggro-processing activities by 50%.

However, limited access has been registered in initiatives for mechanization in the agricultural sector due to the following gaps

- (a) reluctance by the private sector to participate in promoting smallholder farmers' mechanization, arguing about a small market in the smallholder than the large-scale farmers and companies;
- (b) failure by government to maintain machinery;
- (c) political instability due to change of regimes therefore shift in priorities;
- (d) lack of proper management of mechanization initiatives;
- (e) lack of expertise in the use of machinery; and (f) smallholder farmers lack of finances and access to finance to purchase machinery. The foregoing suggests Malawi is still struggling to enhance mechanization in the agriculture sector, despite the efforts and the potency of the sector that could be enhanced for productivity if mechanization initiatives were sustained.

AGRICULTURE MECHANIZATION IN MALAWI: EFFORTS, OBSTACLES, POLICY IMPLICATIONS AND OPTIONS

Policy and programmatic gaps for agricultural mechanization in Malawi

The following policy and programmatic gaps have been noted in Malawi's efforts to mechanize the agriculture sector.

a) Barriers to develop a market and utilization of mechanization equipment and services

Agricultural machinery is a private good that can be manufactured and sold by private companies. Market actors, including international companies, local entrepreneurs, and mechanization service providers, face several obstacles, especially regarding smallholders. Unlike other inputs such as seed and fertilizer, agricultural machinery has substantial economies of scale and reaches its lowest operational costs only under high utilization rates, otherwise it becomes difficult to justify its economic sense. Institutional solutions, such as rental markets, could help to overcome this problem, but are difficult to set up when the window of operation is narrow.

Service provision is even more difficult when transaction costs are high due to small, geographically scattered farming operations. As a result, service providers are reluctant to serve small holders. Those who have their fields ploughed too late risk a yield drop. For example, studies have shown that a 14-day delay reduces maize yield by up to 30% (IFPRI, 2014; Jali et al, 2021). If the number of tractors and equipment is low, building a reliable supply of spare parts and technicians is difficult, which can lead to a vicious cycle. Similarly, access to credit is often limited due to a lack of collateral and the risks associated with rain-fed farming. Market failures inhibit mechanization by creating unfavorable conditions, such as market instability, lack of infrastructure, education and communication.

There are also large exchange rate fluctuations in the country, which harm machinery importers, coupled with infrastructure challenges. Access to fuel is still a challenge, with increasing fuel costs, shortages and intermittent supply. Farmers complain about the low skill and knowledge levels of technicians and operators, coupled with limited public training and low private companies incentives to fill the knowledge, skills and information gap on agriculture machinery operation and maintenance.

b. Government agencies failing to support mechanization

The mechanization landscape in Malawi does not have a qualified pool of technicians to anchor the production and servicing of machinery. This is largely because TEVET Policy focuses on production of technicians in regular trades such as carpentry and bricklaying, other than machinery, further limiting skills and technical base on agriculture machinery in the country.

c. Less focus on mechanization related extension services

Information is key for decision making processes, yet most farmers lack information about available farm mechanization options. There is also a category of smallholder farmers with required purchasing power but fail to make such decisions because information is not available at community level. Currently, the extension policy doesn't create awareness on the benefits of mechanization of smallholder farms neither does it support the servicing of machinery currently owned by some farmers. Furthermore, demonstrations and education on efficient practices and technology are absent services towards farmers.

d. No deliberate efforts towards matching production/importation of machinery and farmer needs

Although there are many machines available for farm activities, there is need to develop relevant and handheld specific machinery that will address the need of smallholder farmers, essentially adaptable technologies. There is minimal research and development which would play a critical role in coming up with such appropriate machinery that will answer needs of the smallholder farmers. In essence, mechanization is not approached from a broader value chain perspective, with early involvement of all relevant stakeholders.

e. Lack of farmer led agriculture mechanization finance

Due to high prices and longer period of depression for machinery, access to finance is important to ensure that such machinery is available at farm level. However to achieve this, farmers need to overcome collateral, moral hazard, and covariance of risks. Current policies and

AGRICULTURE MECHANIZATION IN MALAWI: EFFORTS, OBSTACLES, POLICY IMPLICATIONS AND OPTIONS

programmes have not addressed these gaps and the AGCOM model is yet to register results positive in this direction.

f. Undeveloped agricultural machinery industry in Malawi

Most tractors and other agricultural machinery are either imported or locally made, with potential associated problems. Locally produced machinery is usually low in quality and high on price, due to the underdeveloped nature of the machinery manufacturing industry in Malawi. This in turn results in poor demand among users of machinery.

Policy Recommendations and Options

a. Build a conducive environment for private markets and service providers instead of importing machinery.

It is important that the private sector, especially commercial banks invest in mechanization. The Export Development Bank (EDF) and the Malawi Agriculture and Industrial Investment Corporation (MAIIC) are some of the strategic partners that can also support mechanization and other strategic investment in this sector. The TEVET policy should focus also on agriculture mechanization to enable graduates access loans than allow them fabricate machinery and offer maintenance service.

b. Foster PPP in Mechanization enhancement

The transformative agenda of the NAP places public private partnerships as one of the most significant vehicles through which the policy desirables will be realized. Justification for PPP arrangement rests in the fact that risks are too high in Malawi's financial system, such that without recourse to Government intervention, it is extremely difficult for smallholder cooperatives and medium scale farmers to access credit for the high-cost farm machinery, equipment, and infrastructure. This justifies the need for Government involvement, albeit in a PPP arrangement, to capacitate the highly promising medium scale farmers and the well-organized smallholder farmers to access machinery and

related services. Key government programmes that are running PPP credit guarantee schemes such as AGCOM, TRADE Programme and SVTP should go beyond fostering access to mechanization on small-scale farmers only but also to medium scale farmers. On the demand side, cooperative policy should include strategies for farmer organizations to align themselves to joint-machinery ownership scheme efforts by financial services.

c. Investment in Training and Usage Services

It is important that government identifies and establishes training centers across the country to train farmers and other relevant stakeholders on use and maintenance of farm machinery and equipment. In addition to training, the centers in liaison with district agricultural staff, civil society organizations and non-governmental organizations in the agriculture sector, may carry on farm demonstrations on the use of different farm machinery and equipment in all agricultural extension areas across the country, to sensitize the locals on different kind of farm operations that machines are capable to perform. Among others, the demonstrations would concentrate on the mechanics of farm machinery and equipment as well as how farmers minimize costs associated with access and use of the mechanization. This could in turn induce demand for farm machinery and equipment among smallholder farmers. The agriculture extension policy in place should promote placement of agriculture engineering technicians in EPAs to champion this course.

d. Increasing mechanization investments for women and elderly farmers

Women farmers provide most of the farm labour especially in rural areas. Most men migrate in big numbers to urban areas to seek alternative employment, resulting into labor shortage in the rural areas. Women and elderly farmers take care of the small farms. A well-organized, possibly private sector-driven mechanization service center to provide support to women farmers to complete the farm work in time and to achieve desired yields and income is a worthy investment initiative. The current community college programme of the government should promote production of artisan skills needed to undertake small-scale fabrication. Furthermore, government should consider promoting usage of two-wheel single cylinder diesel tractors for agricultural mechanization especially at small holder farmer level. These tractors can easily be adapted to the small-scale mechanization efforts suitable to the majority stallholder farmers, also key to suitable zero tillage or conservation agriculture regimes.

AGRICULTURE MECHANIZATION IN MALAWI: EFFORTS, OBSTACLES, POLICY IMPLICATIONS AND OPTIONS

Conclusion

Agriculture mechanization is key to agriculture development as it enhances productivity in the sector. Farmers need to adopt mechanization, to increase productivity and address inefficiency along the value chains in the sector.

There are several challenges that affect adoption and utilization of agriculture mechanization in Malawi. Harnessing opportunities under public-private partnership, incentivizing local production and innovation, ensuring access to mechanization finance and most importantly revitalization of policies and programme interventions around mechanization is key to making Malawi's agriculture productive and highly commercialized, in the pursuit of a lower middle income status by 2030, towards an inclusively wealthy and self-reliant nation by 2063.

Selected References

- Land into IFAD projects: Experiences from the Field. Rome: IFAD.
- IFAD. (2015). Land tenure security: scaling up note. Rome. Rome: IFAD.
- Jayne, T., Chapoto, A., & Sitko, N. (2014). Is the scramble for land in Africa foreclosing a smallholder agricultural expansion strategy? . *Journal of International Affairs* , 67(2):35-41.
- Kahan, D., Bymolt, R., & Zaal, F. (2018). Thinking Outside the Plot: Insights on Small-Scale Mechanisation from Case Studies in East Africa. *The Journal of Development Studies*, 54:11, 1939-1954.
- Loxley, J. (2013). Are public-private partnerships (PPPs) the answer to Africa's infrastructure needs? *Review of African Political Economy*, 40, 485-495. Retrieved from <https://www-jstor-org.ezproxy.uct.ac.za/stable/pdf/42003355>.
- Behrendt , K., & Pappas, D. (2020). Farm Mechanization and Potential role of Robotics in Malawi. Proceedings of the 3rd INFER Symposium on Agri-Tech Economics for Sustainable Futures. Harper Adams University.
- Daum, T, Adegbola, YP, Kamau, G., Kergna, AO, Daudu, C, Zossou, RC, Crinot, GF, Houssou, P, Mose, L, Ndirpaya, Y, Wahab, AA, Kirui,O, Oluwole, FA, 2020, Impacts of agricultural mechanization: Evidence from four African countries, Hohenheim Working Papers on Social and Institutional Change in Agricultural Development, viewed 18 May 2022, < https://research4agrinnovation.org/wp-content/uploads/2020/06/Working_Papers_3_Mechanization_Impacts.pdf>
- FAO, 2016., Agriculture Mechanization, a key input to sub-Saharan Africa smallholders, vol. 23, retrieved from <Agricultural` mechanization: A key input for sub-Saharan Africa smallholders - World | ReliefWeb>.
- Holden, S., Deininger, K., & Ghebru, H. (2009). Impact of low-cost land certification on investment and productivity. *American Journal of Agricultural Economics*, 91(2), 359-373.
- IFAD. (2009). The new rurality: its implications for a new, pro-poor agricultural water strategy. Rome. Retrieved June 12, 2015, from http://www.ifad.org/english/water/innovat/strategic/New_rurality_web.pdf
- IFAD. (2011). Strengthening Women's Access to

AGRICULTURE MECHANIZATION IN MALAWI: EFFORTS, OBSTACLES, POLICY IMPLICATIONS AND OPTIONS

FURTHER INFORMATION

NPC

The National Planning Commission was established through an Act of Parliament in 2017 with two main mandates.

1. To coordinate the development of long and medium term national development plans for Malawi including the flagship projects that would operationalise them.
2. To oversee the implementation of those plans and coordinate the efforts of different stakeholders in achieving common objectives defined in the overall national development agenda.

Foresight and Anticipatory Governance project

This is an initiative that seeks to introduce and mainstream innovating ways of development planning by making sense of events occurring and likely to occur in the country's development space, and scanning the horizon of global, regional and local trends on key development issues in order to build agility among planning agencies, with which to respond to unforeseeable events taking place in the country's development space. The project relies on data and information generated through sustained research across economic and social development spheres. The policy briefs series are produced to provide information for consideration in government planning units.

CONTACTS

For more information:

Dr. Joseph Nagoli

Director of Knowledge & Learning
National Planning Commission

E: jnagoli@npc.mw

Dr. Andrew Jamali

Research Manager
National Planning Commission

E: ajamali@npc.mw

Funded by UNDP, under the Foresight and Anticipatory Governance Project implemented by the National Planning Commission in collaboration with the Department of Economic Planning and Development, in the Ministry of Economic Planning and Economic Affairs (MoFEA)