

SMALLHOLDER AGRICULTURAL MECHANIZATION IN AFRICA

Addressing governance challenges of state- and market-led mechanization efforts

In the past decade, agricultural mechanization has returned to Africa's development agenda, which has led to a variety of state and market-led initiatives to promote mechanization. Overwhelming evidence suggests that past mechanization strategies often failed because institutional aspects were neglected. To avoid these pitfalls in current and future efforts, this policy brief analyses which governance challenges must be addressed to make mechanization economically, socially and environmentally sustainable.

Governance challenges of smallholder mechanization - concepts and examples

In many African countries, labour, rather than land, is a constraining factor for agricultural development. Yet African farming systems remain the least mechanized of all continents. Indeed, 70% of smallholder farmers, who continue to dominate African agriculture, cultivate parcels of less than two hectares by hoe. According to the Food and Agriculture Organization, there are still fewer than two tractors per 1,000 ha of cropland in Africa since the 1960s. This number has sharply increased in all other continents, reaching ten tractors per 1,000 ha in South Asia and Latin America.

Thus, mechanization can play a key role in unlocking underutilized agricultural potential in Africa. The challenge is to develop institutional arrangements that enable smallholder farmers to access mechanization services for production, post-harvest handling and processing. There are three types of institutional arrangements, or governance structures, under which mechanization can be provided: by private sector companies (market governance), by government agencies (state governance) and by community-based organizations, e.g., cooperatives that allow smallholders to jointly own machinery. This policy brief focuses on the challenges of market and state governance predominant in smallholder mechanization. The brief uses examples from Ghana, but the challenges and recommendations are relevant for all countries that aim to promote mechanization.

Why is it difficult to develop a market for mechanization 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 with regard to smallholders:

Unlike seeds and fertilizer, agricultural machinery has substantial economies of scale and reaches its lowest operational costs only under high utilization rates. Institutional solutions, such as rental markets, can help to overcome this problem, but are difficult to set up when the window for operations is narrow, e.g. in Ghana where the ploughing period is just 45 days. 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 smallholders. If served at all, smallholders must often accept low quality ploughing because their bargaining power is weak. Those who have their fields ploughed too late risk a yield drop; studies have shown that a 14-day delay reduces maize yield by up to 30%. Female farmers have even less access to services.

Problems can also arise because complementary services are not available. As long as 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 riskiness of rain-fed farming. In Ghana, prohibitively high interest rates in the range of 35% render loan-based investments for tractors and equipment unprofitable.

Market failures inhibit mechanization by creating unfavourable conditions, such as market instability, lack of infrastructure and education. In Ghana, large exchange rate fluctuations harm machinery importers. Ghana also faces infrastructure challenges; e.g., access to fuel is improving but is unreliable in remote areas, and country-wide fuel shortages occur sporadically. Regarding education, far-



mers complain about the low skill and knowledge levels of technicians and operators. There is a lack of public training, and private companies have little incentive to fill the gap. Machinery companies and dealers do not offer trainings to customers in the large market for used machinery, and informal vocational training, although popular for technicians and operators, is of mixed quality.

What are the problems of government agencies that support mechanization?

To address these market failures, governments may subsidise or even provide machinery through state agencies. In Ghana, for example, the government provides tractors at subsidised rates to farmers and to entrepreneurs who run 89 Agricultural Mechanization Service Centres (AMSECs). While this approach could be a promising model of public-private partnership, state governance also faces challenges:

Governments prefer to provide private goods, such as subsidized tractors, rather than public goods, such as education and training because private goods targeted to large and influential farmers generate media attention. In many countries, the amount of public funds spent on machinery exceeds what is spent on education and training, which is necessary for successful mechanization. During the first wave of public mechanization in Ghana, the largest public institute that offers courses for operators trained only two participants in 2012 and none in 2013.

The import and distribution of machinery by government agencies opens opportunities for corruption and misuse of loans as “giveaways” as can be observed in many countries. In addition, governments may lack the capacity to ensure repayment, which threatens the financial sustainability of mechanization schemes. In Ghana, the repayment rate of AMSEC tractors was just 35%.

The government might fail to choose the most suited machinery or beneficiaries because there is no link between

demand and supply. In Ghana, government-imported machinery was financed by concessional loans and grants, which forced the government to choose machinery from lists of pre-selected producers, typically from the lending country. This precluded the selection of the most appropriate brands and led to frequent shifts of brands, making private investments in spare parts difficult. Combined with a lack of maintenance and the absence of qualified operators and technicians, this resulted in frequent and long breakdowns and, consequently, a decline in the acreage served by the AMSECs. One of the AMSECs studied ploughed 200 ha with nine tractors in its first year, 2008, but only 40 ha with the only two tractors that remained functioning in 2014.

Recommended policy measures:

- **Build a conducive environment** for private markets and service providers instead of importing machinery. This includes, especially, investing in education and training.
- **Combine advantages of different actors** such as private companies, government agencies and community-based organizations. E.g., private companies could train operators and technicians with quality assurance by the state.
- **Focus on technical and institutional solutions for smallholders.** E.g. promote small two-wheeled tractors and small processing equipment or compensate tractor-owners for the transaction costs of providing services to smallholders and encourage the latter to collectively address service providers.
- **Consider the potentials of ICT-based solution,** including organizing and linking smallholders with service providers.

This Policy Brief is based on the article:

Daum T and Birner R (2017) The neglected governance challenges of agricultural mechanisation in Africa - insights from Ghana, Food Security. <https://doi.org/10.1007/s12571-017-0716-9>.

Available at www.research4agrinnovation

PARI implementing partners: ZEF/University of Bonn, University of Hohenheim, Technical University Munich, the Forum for Agricultural Research in Africa (FARA) and its national partners, the African Growth and Development Policy Modeling Consortium (AGRODEP) facilitated by the International Food Policy Research Institute (IFPRI, Africa Office), and research collaborators in India.

PARI is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ).

IMPRINT

Center for Development Research (ZEF)
Genscherallee 3 | 53113 Bonn | Germany

E-Mail: presse.zef@uni-bonn.de

Phone: +49-(0)228 - 73 18 46

Brief prepared by: Thomas Daum

UNIVERSITY OF HOHENHEIM



zef
Center for
Development Research
University of Bonn