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Mechanization Policy— Creating an Enabling Environment for Private-sector Investment

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INTRODUCTION

Mechanization increases the power applied to agricultural operations and is one tool among many for improving farm productivity. It alone cannot drive the transformation of agriculture (Pingali 2007). Farmers will mechanize to lower costs and ensure timeliness of operations, allowing a greater area of land to be cultivated. The demand for mechanization is therefore determined by the stage of agricultural transformation reflecting the use of complementary inputs (improved seeds, fertilizer), the intensity of farming, land holdings, and rural labor supply. Countries across developing Asia have mechanized at different rates corresponding to their level of agricultural transformation but also strongly influenced by government policies.

ReSAKSS-Asia organized a knowledge exchange event entitled "Agriculture and Rural Transformation in Asia: Past Experiences and Future Opportunities" to discuss, among many topics, insights into how agricultural mechanization has evolved in countries with different agroecological, institutional and political settings, and what common lessons can be learned for those countries at the early stage of mechanization. This brief summarizes some of the key lessons shared by participants[i].

Patterns of mechanization in developing Asia

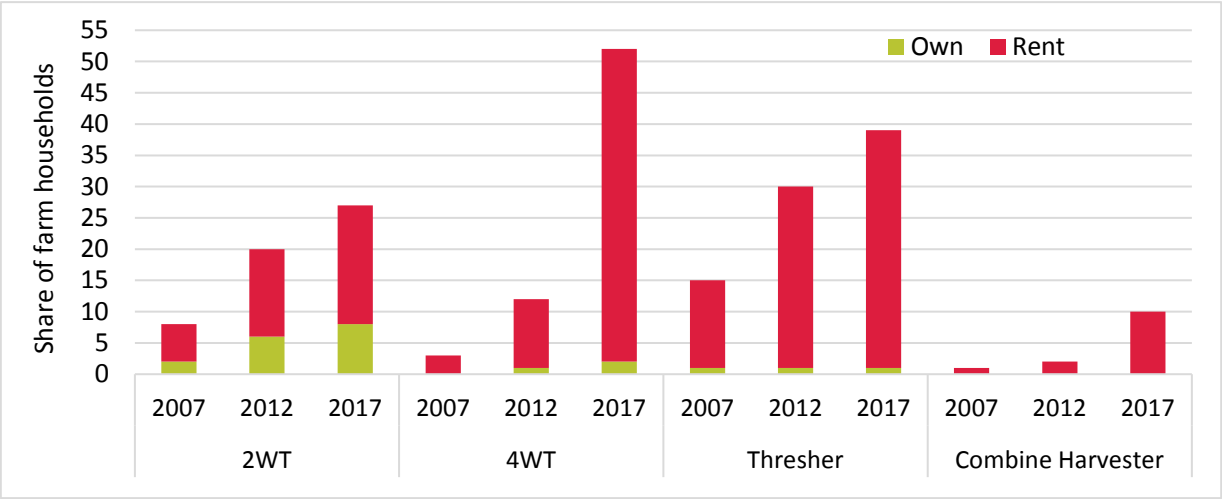
The evolution of mechanization often starts with mechanizing power-intensive activities (e.g. land preparation). However, with appropriate machines and attachments the mechanization of control-intensive farming practices such as seeding, weeding, harvesting and post-harvest processing can be hastened. Control-intensive operations are more labor-intensive therefore these operations are mechanized when relative wages increase.

In most of developing Asia, there is now growing demand for mechanization as complementary investments in agricultural inputs are being realized. To fully benefit from the adoption of improved seed varieties and increased use of fertilizers, farmers must also adopt control-intensive husbandry practices, such as weed control, row planting and maintenance of optimal plant populations. These farming practices also generate high outputs requiring more harvest and post-harvest operations. Thus, they demand higher labor inputs while also generating individual incentives to meet new quality requirements.

At the same time, urbanization has and will continue to pull agricultural workers off farms and into cities. This trend, combined with an increased opportunity cost of labor in the rural area due to various income generating activities outside agriculture, has created upward pressure on the cost of hired labor in agricultural production. While hired labor is a common phenomenon among smallholder farmers in developing Asia, the supply of skilled labor at critical times in the season at affordable wages has constrained smallholders in many, if not most, Asian countries.

These demand side drivers are mirrored by several supply side factors making access to machines easier than ever. Hiring markets have or are emerging quickly in the least developed countries and are crucial for meeting farmers' demand for mechanization. While farmers with small and larger scale farm sizes have co-existed for decades in India and Thailand, smaller farm sizes dominate most of developing Asia making the ownership of machinery by individual farmers unprofitable given their high cost and limited utilization on a single small farm. As seen in China (Zhang, Yang, and Reardon 2017) and Myanmar (Cho, 2018), agricultural machinery owners often group together into specialized cooperatives and maximize their efficiency by traveling across regions to provide services to farmers. Alongside these tractor hire services, a range of other private sector support services such as repairs, spare parts supply, and tractor imports have emerged.

Figure 1— Share of Myanmar farmers using machinery (2007-2017)



Source: Belton, Filipski, Win, and Zhang 2018

The advancement of the mechanization service market has become easier than ever because of policy changes that enable the private sector to lead market development. First, reducing or removing import tariffs on agricultural machinery importation has helped to lower the cost of machines for their would-be buyers. In Bangladesh, Sri Lanka and, most recently, Myanmar, import duties on most machines have been eliminated. This has been coupled with emergence of regional manufacturing centers such as China, Thailand, and India that produce machines that are more suitable for local conditions, are an acceptable quality, and are at prices that are far lower than their American or European counterparts. In many smaller countries unable to support domestic manufacturing, local artisans have also emerged that adapt machinery from other countries to local conditions.

Second, financing for the purchase of new equipment is improving in some countries where private options previously had been limited. In Myanmar, recent policy reform in the financial sector now allows all private banks to do business in agriculture, including financing agricultural equipment, playing an important role in reducing financial constraints for machinery investment. This has been followed by the formalization of land use rights now permitting farmers to use government issued land certification as collateral for loans (Cho, 2017). Cambodia is undergoing similar changes in land laws improving access to loans (Chhun, Bora, and Sothy 2015).

Government subsidies have been used to support both manufacturers and those wishing to purchase equipment. Still, these subsidies have been open to those who meet a transparent set of qualifications, were rarely targeted to specific groups of farmers, and could be used for a wide variety of machinery avoiding distortions to import and hiring markets. Even with subsidies, machinery is typically concentrated among a small number of farmers while the majority access services through the hiring market. For instance, tractor hire services in China have been supported by subsidized prices for some agricultural machinery and information sharing, but the machinery hire market has evolved into an efficient privately-led industry.

Rather than emphasizing direct interventions, many governments in Asia have focused their efforts on R&D. This has included developing machinery and implements utilizing the capacity of University engineering departments and/or concentrating efforts on other types of research, such as the development of new seed varieties that makes the use of mechanization more efficiently. Technical training and extension also helps farmers familiarize themselves with different types of machinery, creating more demand for mechanization and reducing machine downtime for repair.

Conclusion

At the appropriate stage of agricultural transformation, mechanization can play a critical role in alleviating power bottlenecks. Public promotion has often failed in the past and renewed efforts in this area should be well focused. It is only if

there is unmet demand for mechanization and the private sector is failing to invest and meet that demand, that government should play a role in promoting mechanization. Subsidies have been used by Asian governments in the past but they were designed with clear exit strategies and rarely targeted toward specific equipment or firms allowing the private sector to compete and assured machinery was tailored to local conditions. Complimentary policies can also be used to reduce transaction costs for the import and adaptation of machines. Governments can also help fill knowledge and capacity gaps, for example, by conducting soil mapping to determine the appropriateness of different machine types and providing demonstration/education on the use of new technology, equipment repair, and service provision business models. There is unlikely a single "right" formula for government involvement in mechanization beyond facilitative and coordinative roles. Governments that want to play a more proactive role in mechanization can learn from other Asian experiences, as well as learning-by-doing from their own mistakes. Monitoring and evaluation of ongoing interventions will be important for making necessary adjustments.

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[i] This brief summarizes presentations made by the following in a session entitled "Mechanization and the Role of Evolving Machine Services", chaired by Mr. Somsak Mauthorn, Senior Executive Vice President of Siam Kubota Corporation

- Ame Cho, Research Associate, Centre for Economic and Social Development "The rapid rise of agricultural mechanization in Myanmar"
- M. A. Sattar Mandal, Emeritus Professor, Bangladesh Agricultural University "Agricultural Mechanization: Policy Lessons from Bangladesh"
- Sim Sockcheng, Research Fellow, Cambodia Development Resource Institute "Effect of Labor Movement on Agricultural Mechanization in Cambodia"
- Melvin Samarasinghe, Director, Agfour Engineering "Custom Hiring and its Impact on Paddy cultivation in Sri Lanka"

Additional References

Buth Bora, Chhim Chhun, Ear Sothy. 2015. "Effect of Labour Movement on Agricultural Mechanisation in Cambodia" CDRI Working Paper Series No. 107

Pingali, Prabhu, 2007. "Agricultural Mechanization: Adoption Patterns and Economic Impact," Handbook of Agricultural Economics, Elsevier.

Zhang, Xiaobo; Yang, Jin; and Thomas, Reardon. 2017. Mechanization outsourcing clusters and division of labor in Chinese agriculture. China Economic Review 43(April 2017): 184-195.

Acknowledgements

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