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Farm Mechanization Constraints in Rice Cultivation

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Introduction

Ethiopia has the potential to develop rice mechanization due to its 30 million ha of rain-fed rice production and ten river basins with the potential for irrigated rice. The vast potential area suitable for rice farm topography, especially in Fogera and Gurafarda, is the flat to moderate slope, making it less likely to affect the use of agricultural machinery. Demand factors have driven Ethiopian smallholder farmers to start rice production, and market-related opportunities include higher price value of rice grains and increased rice consumption habits. The MoA with ATA initiated the establishment of the Agricultural Mechanization Strategy, which aims to increase national productivity through enhanced and sustainable use of agricultural mechanization technologies to support Ethiopia's middle-income country by 2025 [1]. It aims to raise all levels of Ethiopian agricultural mechanization from 0.1 kW/ha to 1 kW/ha, reduce the use of animal power by 50%, promote the usage of agricultural mechanization technologies that can be used by female farmers, mitigate environmental degradation, and address at least 50% of the needs of pastoralists and agro-pastoralists through mechanization inputs [2]. The National Rice Research and Development Strategy have been developed by MoA with the close collaboration of the different organizations that compile overall rice research and development direction in the country. The research side of the strategy is intended to be implemented and other research centers, but they need to build capacities such as agricultural machinery workshops and laboratories. The increase in production, importation, and consumption of rice has received attention from the government and development partners [3]. Relevant stakeholders have shown their interest in playing their roles to realize the introduction and utilization of farm mechanization technologies through on-farm demos and partnerships with all national and international stakeholders [4]. Free taxes and duties on imported agricultural machinery have made the import of agricultural machinery cheaper, motivating local importers to supply at cheap prices. Both governmental and private financial institutions and credit centers are available in the Ethiopian economy, but special attention should be given to collateral. Banks now offer hire-purchase loans for agricultural machinery, but dominated by government banks [5]. The motivations of farmers for agricultural mechanization technology will also be an opportunity to motivate the speed of technology adoption. Ethiopian smallholder farms need to shift to labor-saving devices and products to increase agricultural productivity, and appropriate mechanization technologies should be available to reduce drudgery and increase productivity [6]. Based on a review of various studies, recommendations are drawn for the development of rice mechanization in Ethiopia. The Rice Mechanization Research System should focus on the physical capacity building of workshop machines, laboratory instruments, and on-farm test sites to promote farm mechanization. Establishing maintenance and assembly centers with adequately trained agro-mechanics and workshop technicians is needed for the promotion of mechanization extension programs [7]. Capacity building of indigenous entrepreneurs is essential for the production of farm machinery prototypes that are adapted to fragmented lands and small holdings. Large-scale demonstrations are required to conduct research and development institutions, and feedback collection on the technologies' usage by end-users is essential. Farmers cannot learn overnight, and they need regularly updated processes of lifelong learning. Organizing agricultural cooperatives would be better because they could buy their inputs and sell their total produce together. Various joint farming ventures are prevalent in New Zealand, Canada, Portugal, Denmark, Norway, the Netherlands, France, and the UK [8]. The average farm landholding in Ethiopia is less than 2 ha and is decreasing due to the increasing population. Land holdings need to be consolidated to give their owners access to the benefits of agricultural mechanization. Ethiopia's mountainous terrain and fragmented land holdings mean that promoting small-scale machinery can be suited to Ethiopian conditions. Small-scale mechanization can be suitably used for highly fragmented land with a vibrant private sector, academic engagement in policy processes, and localized technology interventions. Ethiopian researchers and higher learning institutions have a critical role to play in investigating mechanization options. There is a need for a clear division of roles between the public and private sectors [9]. The public sector is best suited to providing subsidies, reducing transaction costs, and promoting the use of new technology. Experiences from African and Asian countries suggest that public-sector-supported private-sector mechanization is the best model. Sales outlets that are within easy reach of farmers are essential to the development of a successful and sustainable private farming system. Special attention is needed to create conditions so that importers, distributors, and small retail outlets can develop. These commercial units may range from a small, one-family shop in a village to a large national distributor for domestically produced and imported machinery. The supply chain approach to analyzing mechanization is a useful framework to describe the extent and typology of mechanization processes taking place in Ethiopia. The supply chains for mechanization cover the manufacturing and importation of machines, mechanized service provision, and spare parts and repair services for machinery maintenance [10]. Ethiopia's Ministry of Agriculture needs to promote an improved paddy and milled rice marketing system, with the possibility of incorporating rice into the Ethiopian commodity exchange trading platform. The government of Ethiopia must prioritize mechanization throughout the entire rice value chain, not just at the production level. More focus should be placed on post-harvest and processing technologies that assist in boosting the commercialization of farm owners' production.

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Conflict of Interest

None

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