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## Appropriate Agricultural Mechanisation for Increased Crop Productivity and Income Generation in Rural Ethiopia

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### Abstract

The growth of available farm power per hectare has been very slow resulting in high drudgery on smallholder farms of Ethiopia. Low horse power (8–20 hp) two-wheel tractors (2WT) offer an option for rural farmers in addition to animal traction and human muscle based systems that characterise smallholder agriculture in Ethiopia. The 2WTs are multi-purpose, offering services such as direct planting with precise seed and fertiliser placement, harvesting, threshing and shelling, water pumping for irrigating high value crops, and transport. Smallholder farmers can have access to these tractors and equipment through services provided by individual and youth group service providers (SPs). Smallholder farmers benefit from the services provided by SPs while the SPs can generate income for themselves in the process of providing services in rural communities. CIMMYT and its partners have been testing and promoting the use of 2WT based technologies including planters for maize, wheat and teff; threshers for wheat, teff and other related crops; maize shellers; reaper harvester for wheat, water pumping for irrigation of high value crops and trailers for transportation. The cost benefit and profitability analyses were conducted for each 2WT accessory separately and in combination to gauge the economic viability of single and combined operations from both the farmer's and service providers' stand point. The gross margins per ha when farmers use 2WT based technology is higher by 55–89% compared to a non-mechanised farmer practice. The higher gross margins were due to reduced costs for ploughing, planting, fertiliser application, threshing and transportation for both crops. Service provision of 2WT based technologies proved to be viable and profitable generating a high and positive Net Present Values (NPV). A combination of seeder, thresher, trailer and water pump gives the highest financial benefit ranging from US\$24,465 to US\$62,081. With initial capital investment cost of US\$7,275 the second more profitable combination is the seeder, thresher and trailer that can generate US\$24,122-US\$61,738. Break-even point in hours of machinery operations for the seeder, transport and thresher is 27.3–304.3 hours. Therefore, agricultural mechanisation has a high potential of reducing drudgery on farms, increasing farm productivity and generating income in rural Ethiopia

**Keywords:** Drudgery, Ethiopia, food security, income generation, mechanisation, service provision, smallholders, two wheel tractor, youth employment

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