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CSIR Crops Research Institute, Ghana

## \*CORRESPONDENCE

Tamrat Gebiso  
✉ gebiso.challa@gmail.com

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# Impact of farm mechanization on crop productivity and economic efficiency in central and southern Oromia, Ethiopia

Tamrat Gebiso<sup>1\*</sup>, Mengistu Ketema<sup>2</sup>, Arega Shumetie<sup>2</sup> and  
Getachew Legese Feye<sup>3</sup>

<sup>1</sup>Socioeconomics Research Directorate, Oromia Agricultural Research Institute, Awella, Ethiopia,  
<sup>2</sup>Ethiopian Economics Association, Addis Ababa, Ethiopia, <sup>3</sup>Research Projects Coordinator,  
International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia

**Introduction:** Farm mechanization has multi-dimensional impacts on agricultural production systems like economic efficiency and productivity, thereby improving the quality of life in the farming community by reducing work drudgeries. However, these impacts were not studied empirically in Ethiopia. Hence, this research was initiated to estimate the level of economic efficiency, and productivity of wheat and barley, and the impact of farm mechanization on economic efficiency and productivity of wheat and barley.

**Methods:** The analysis was done for 232 and 257 wheat and barley producer farmers respectively who are selected from the Arsi and West Arsi zones. The stochastic frontier model was used to estimate economic efficiency while augmented inverse probability weighted (AIPW) was used to estimate the impact.

**Results and discussion:** Based on the result, it is apparent that farm mechanization has a significant positive impact on wheat productivity while the percentage change in average treatment effect for the barley was not statistically significant. Farm mechanization also affects wheat and barley economic efficiency positively. Hence, we recommended the wider use of farm mechanization to improve economic efficiency and productivity. Therefore, policy design should focus on ways to avail farm machinery easily like establishing farm mechanization service centers and facilitating credit services for mechanization service renders.

## KEYWORDS

augmented inverse probability weight, economic efficiency, farm mechanization, impact, stochastic frontier analysis

## 1 Introduction

The impacts of agricultural mechanization have been estimated for different outcome vary in different regions of the world. *Aminass* (2001) and *Houmany et al.* (2013) pointed out that farm mechanization has multi-dimensional impacts in agricultural production system like economic efficiency, and life quality of the farming community by reducing work drudgeries. Its introduction can also increase the productivity of the farming system significantly, especially where agriculture is more dominated by traditional technologies. Mechanization reduces production costs, thereby increasing profit and reducing food costs (*Cossar, 2019; Bello, 2012*). Farm mechanization has great impacts on factor productivity improvement like labor productivity, land productivity, and capital productivity (*Goyal et al., 2014*). Moreover, the literature indicated that farm mechanization has an impact on the adoption of technologies like an improved seed, chemical fertilizer, agrochemicals, etc., and crop yields (*Takeshima*

# Economics Efficiency And Farm Mechanisation

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*Farm mechanization in India: Economic issues, perspective and opportunities* Ranjith Kumar P.S, Prasanna Kumar P.S ,Prem Jose Vazhacharickal, Mechanization is a process of replacing biological sources of energy involving animal and human labour to mechanized sources of energy Farm mechanization indicates the use of machines for conducting agricultural operations replacing the traditional methods which involve human and animal labour In the period 2004 05 to 2011 12 robust growth in the secondary and tertiary sectors led to significant job creation in agriculture sector Tractors and power tillers have been driving the farm mechanization in India Tractor sales have grown at a CAGR of 9.0 % in Financial Year FY 05 15 to around 5.5 lakh tractors in FY15 around 2.3 lakh in FY2005 whereas sales of power tillers have grown at a CAGR of 10.6% in FY2005 to 2015 to 48 000 power tillers in

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Mechanization in the United States, 1950-1960, 1960

**Economic indicators of the farm sector. Production and efficiency statistics**, 1981 **Farm Machinery and Processes Management in Sustainable Agriculture** Edmund

Lorencowicz, Bruno Huyghebaert, Jacek Uziak, 2024-09-18 This book gathers the latest advances innovations and applications in the field of sustainable and smart agriculture as presented by leading researchers at the XII Farm Machinery and Processes Management in Sustainable Agriculture FMPMSA held in Lublin Poland on June 12 14 2024 The book covers highly diverse topics including management of field and livestock production machinery management of biomass and agroenergy production plant protection soil management and agrochemicals application smart farming and sustainability ergonomic labor organization and sustainable agriculture in the European Union and other countries The papers which are published after a rigorous international peer review process highlight numerous exciting ideas that will spur novel research directions and foster multidisciplinary collaboration among different specialists **Consequences of Small-farm**

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*Human-Centered Agriculture* P. K. Nag, L. P. Gite, 2020-08-31 This book explores the interplay of farm mechanization human factors and climatic and other environmental uncertainty in agriculture using an ergonomics based approach to discuss solutions to the traditionally acknowledged vulnerability of the sector It converges contemporary research documentation case studies and international standards on

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