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Can farmer-to-farmer mechanisation enterprises contribute to filling the technology adoption gap in Zambia?

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INTRODUCTION AND AIM OF THE STUDY

Agricultural productivity in Zambia has been declining during the last years. One of the reasons is **low adoption of mechanical power**



RESULTS

Farm size of the tractor owner is negatively correlated with MHS provision (Fig. 2).
Better logistics in the supply chain of MHS lowers transaction costs (Fig. 3).

500-

(1.8% at national level). As owning
a tractor is a large investment for
smallholders who represent 96% of
farmers' population, to promote
Mechanization Hire Services
(MHS) from tractor owners to non-

owners is likely the most efficient channel to increase technology adoption.

The study is aimed to assess how the farm size of the tractor owner, partial subsidies to hire in tractors and lower logistics and tractor ownership costs contribute or constrain the **development of MHS enterprises** from farmer-to-farmer in Zambia.

METHODOLOGY

Primary data collection: Interviews with Tractor Service Providers (TSPs) and smallholders.

Development of the Mathematical Programming Model (MPM): A typical farm of a TSP was modeled using the agent-based software package MPMAS.



 Increased skilled labor to fix tractor breakdowns reduces repairing costs (Fig. 4) and encourages local manufacture (Fig. 5).

 Partial subsidization of MHS reduces tractor ownership costs and increase technology access (Fig. 6).







Along the estimated tractor's lifetime, the model was able to indicate:

- According to the actual use of the machinery, when to buy spare parts, do maintenance and save money for possible repairs (Figure 1).
- When to use own machinery and when to hire in.
- How much machinery services to offer.
- When to repay machinery an inputs loans.
- Possibility of land expansion and other farming decisions (land use, inputs, labor, sellings, home consumption).



Fig. 4: Access to decentralized mechanical centers



Fig. 6: Hire out ripper when paid with government subsidy

Fig. 5: Locally manufactured ripper

CONCLUSION AND RECOMMENDATIONS

- Tractor ownership incentives should be focused on small-landholder farmers more prone to hire out machinery to non-owners.
- Better logistics (mobile technologies, extension officers, NGO's intervention, etc) can diminish transaction costs and facilitate access and supply of MHS.
- Escalation of mechanical centers reduces TSPs costs augmenting the supply of MHS.
 The use of subsidies helps to raise tractor utilization rates and develop economies of scale that guarantee the sustainability of MHS enterprises.

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