CCARDESA

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# Breaking Barriers to Mechanisation in Conservation Agriculture

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## Background

Conservation Agriculture (CA) is gaining popularity due to its positive long term impact on the environment. This farming approach emphasizes a combination of three farming practices aimed at (i) maintaining an organic matter soil cover, (ii) causing minimal soil disturbance and (iii) growing crops in rotations or sequences. This farming approach has long term benefits of maintaining or restoring soil health, fertility and structure.

CA is often practiced through minimum tillage or no till practices. When mechanized, CA tillage operations require less time and have lower energy demand compared to plough based tillage. As a result, CA is often popular amongst large scale commercial farmers compared to the smallholder farmers. CA is embraced by large scale commercial farmers who are able to realize its benefits and convenience because they have capacity to afford the use of machinery in their operations .

Conversely, smallholder farmers generally lack sufficient resources to afford production inputs (such as the use of power units, seeders, rippers and sprayers which are vital for CA) and as result they often don't employ machinery and consequently achieve very low production and productivity levels. In the absence of using machinery in CA the alternative is to use human effort or animal draft power which greatly limits the amount of area that can be cultivated. Hence the land area put under CA for smallholder farmers averages about a quarter of a hectare per holding.

Concerted effort to develop the necessary implements has facilitated notable mechanisation of CA in China, India and Brazil. Valuable lessons also exist on the mechanization of CA in SADC countries such as Zambia where CA has been widely promoted even amongst smallholder farmers. Experiences from Zambia indicated that to achieve sustainability it is always best to involve the private sector in the provision and servicing of CA equipment. Furthermore, credit arrangements and loan recovery should be in the hands of the private sector for sustainability (Sims *et al*., undated).

In Southern Africa, smallholder farmers comprise the majority of farmers in the region who need to be targeted to improve the adoption of CA in the region which will in turn benefit the environment. Identification of challenges confronting the adoption of mechanization in CA is therefore critical towards devising solutions towards adoption of mechanization in CA in the SADC region.

### Constraints to Adoption of CA Mechanization

A number of socio-economic factors explain impediments to the adoption of mechanization in CA. Mechanization requires inputs which most smallholder farmers are unable to afford (Sims and Kienzle, 2015).

Weeds control is a major challenge associated with CA and can have a high labour demand especially if it is done manually. The high rural to urban migration in the region exacerbates the labour constraint by leaving farming chores to be done by women, children and the elderly. This has negative implications to the attractiveness of CA especially if it relying on human power as it is often the case with most smallholder farmers in the region.

However, where herbicides are used in CA practices, the labour demand is reduced considerably. Access to herbicides may also be a challenge due to their high costs especially for smallholder farmers who have limited resources.

Other constraints to the wide adoption of mechanization in CA include the following:

- CA equipment is more expensive than the conventional types making them unattractive to purchase.
- Poor availability and high cost of spare parts, lack of training on operation and maintenance of farm machinery, inadequate facilities for servicing and repair of farm machinery.
- Poor suitability of imported machinery to the local context is also an important challenge.
- Poor availability of CA equipment compared to those for conventional tillage.
- Small farm sizes work against mechanization of CA due to lack of the economies of scale.
- Inadequate support services such as credit facilities because high interests rates make it non-viable for financial institutions to extent credit for acquisition of such equipment given the size of land being farmed.
- Inadequate research support, extension and technology transfer mechanisms for CA.
- Weak information delivery systems e.g. on new technologies, cost of inputs, market prices etc. to facilitate the making of informed decisions by relevant value chain actors.

## Conclusions

The success of adopting mechanisation in CA is dependent upon the existence of appropriate government policies, supporting infrastructure, services and skills. The machine quality, availability, durability as well as costs are also critical (FAO and ESAP, 2011). Therefore, mechanisation of CA can be achieved through:

- Formulation of a Sustainable Mechanisation Strategy which encompasses CA at national level.
- Provision of policy support for agricultural machinery manufacturers is necessary e.g. through input subsidies to facilitate switching to appropriate CA investments.
- Local manufacturing is more sustainable in the long term than importing. Some simple equipment can be fabricated by local artisans after some training.
- Provision of after-sale service and having: a functional network for maintenance, enough spare parts including organizing training for operators is important.
- Technical cooperation with Brazil and Asian countries particularly China and India where machinery for small holdings has been highly developed could assist in adapting the technologies in other regions.
- Creation of access to suitable finance and credit mechanisms to facilitate purchase of CA inputs and services.
- Mechanisms of facilitating the involvement of the private sector in the promotion of CA mechanization is essential for sustainability.

## Bibliography


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