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Determinants of Adoption of Climate Smart Agricultural Practices by Smallholder Farmers in Buhera and Chiredzi Districts of Zimbabwe

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ABSTRACT

This study was set to assess factors that drive adoption of six climate smart agriculture technologies in Buhera and Chiredzi districts of Zimbabwe using a sample size of 240 households. Multivariate probit analysis was used to determine factors that influence smallholder farmers' decision to adopt climate smart agriculture technologies. The study finds that age, gender, education of household head, household size, membership to social group, land size, land ownership, and training influence adoption of the six climate smart agriculture technologies. Therefore, policies that allow an improvement in land size and ownership should be given full support by both government and NGO community. The study further recommends that there should be more trainings on benefits of various climate smart agriculture technologies. Farmers should further be encouraged to participate in social groups for easy access to extension information on climate smart agriculture.

KEYWORDS

Agricultural Technologies, Climate Change, Food Security, Multivariate Probit, Smart Subsidies

1. INTRODUCTION

Climate change poses a major challenge to agricultural and food production systems in developing countries. It is now a global concern threatening agro-based economies which rely on rain-fed agriculture (Feleke, 2015; Meybeck et al., 2012; Nyika, 2020). Studies have shown that farmers in developing countries are vulnerable to climate change induced shocks (Mapfumo et al., 2013; Fadina & Barjolle, 2018; Lewis et al., 2018), leading to reduced agricultural production, food insecurity, reduced incomes and high prevalence of rural poverty in these countries (Ubisi et al., 2017). Agriculture, food security and climate change are interconnected and can be addressed simultaneously to develop resilient food production systems (Food and Agriculture Organization, 2013). According to Food and Agriculture Organization (2013), agricultural production activities can simultaneously contribute to

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food security and climate change; and climate change can adversely impact agricultural and food production systems. For agricultural production to be sustainable, it should be done in way that it ensures food security whilst mitigating climate change. The Food and Agriculture Organization (2013) extrapolated from the terms agriculture, food security and climate change to come up with the concept of climate smart agriculture (CSA). In this regard, CSA is an approach that seeks to move agriculture from its present state to one where agricultural production is higher and sustainable and where agricultural activities contribute less to climate change (USAID, 2016).

Examples of climate smart agricultural practices are conservation agriculture, agro-forestry, crop rotation, crop intensification, irrigation, mulching and intercropping (Climate Technology Centre and Network, 2017). These practices simultaneously help farmers to adapt to climate change and to mitigate its effects (Agriculture for Impact, 2015). In light of intermittent occurrence of negative weather extremes that smallholder farmers face, adoption of CSA practices can ensure food security at the household level and can help in improving their livelihood outcomes (Holmgren, 2012; CIAT & World Bank, 2017; Climate Technology Centre and Network, 2017; Makate et al., 2018; Lewis, Mohamed & Alfredo, 2018; Hernández, 2020). Despite their benefits, literature shows that adoption of the CSA practices has been relatively low, slow and inconsistent (USAID, 2016; Tiamiyu et al., 2018). The situation is even worse for female farmers as they face barriers to adoption (Murry et al., 2016).

As a way of mitigating climate change effects, many smallholder farmers in Africa have engaged themselves in several off-farm livelihood strategies such as buying and selling, gold panning and sale of handcrafts (Harvey et al., 2014; Shiferaw et al., 2014). Despite this, farmers have remained vulnerable to economic and climatic shocks. In order to improve agricultural production, rural incomes and resilience, adoption of climate smart agriculture in Zimbabwe need to be scale up (Climate Technology Centre and Network, 2017; USAID, 2016). The common understanding is that adoption of technologies by farmers depends on accessibility to technologies, promotion of the practices and training of the farmers. However, there are other factors that can influence the behaviour of farmers in adoption of technologies. These include the demographic, social, cultural, political and institutional environment under which smallholder farmers practice their farming (USAID, 2016).

Kassie et al., (2015) found out that farmers are more into traditional conventional farming than innovative agricultural production techniques despite different stakeholders promoting sustainable agricultural practices. The concept of climate smart agriculture was developed to sustainably improve productivity and profit while ensuring that farmers adapt and become resilient to the adverse impacts of climate change. In addition, the International Fund for Agricultural Development (IFAD) explained the role that CSA plays in ensuring a safe operating space for global food system (IFAD, 2012). International Food Policy Institute (2016) also researched on understanding farmers' adoption of multiple conservation agricultural practices. The findings provide great insights in climate resilient technologies despite the requirement for farmers to adopt all the three technologies as a technology bundle called conservation agriculture. However, the authors noticed that farmers make independent decisions in adopting different climate resilient technologies. In this case, policies that help farmers move from traditional conventional production systems are required for farmers to leap the benefits of CSA technologies.

Several countries signed an agreement in Paris to include climate related strategies in their national development plans (FAO, 2015). At a national level, Government of Zimbabwe developed the new 2018 National Agricultural Policy Framework (GoZ, 2018), which includes promotion of climate smart agriculture. The policy seeks to achieve this by offering economic incentives "smart subsidies" to farmers adopting climate smart technologies. This shows the concern of the government in the low adoption rates of technologies. The policy framework justifies the smart subsidies because Zimbabwe is the third largest emitter of greenhouse gas at 16.3% in SADC necessitating the need for CSA to help reduce emissions of greenhouse gasses (Dziura, Vovk, & Raneta, 2020).

Taking lessons from SADC countries like Malawi, a different approach in investments in climate smart agriculture has been observed in Zimbabwe. The Malawi National Agriculture Policy of 2016