



# Constraints to the utilisation of conservation agriculture in Africa as perceived by agricultural extension service providers

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## ABSTRACT

Conservation Agriculture (CA) is a knowledge-intensive set of practices which requires substantial access to functional agricultural extension services to enable utilisation. Despite this importance, the perspectives of those providing extension services to smallholder farmers have not been fully investigated. To address this, we qualitatively explore the perspectives of agricultural extension providers across six African countries to understand why uptake of CA has been limited, as well as the institutional changes that may be required to facilitate greater utilisation. Across the diversity of geographical, political and institutional contexts between countries, we find multiple commonalities in the constrained utilisation of CA by smallholder farmers, highlighting the difficulties non-mechanised subsistence farmers face in transitioning to market-oriented farming systems such as CA. The primary constraint relates to the economic viability of market-oriented farming where farmers remain in low input and low output systems with limited exit points. The assumed exit point used by CA programs appears to have led to a culture of financial expectancy and reflects a continuation of top-down extension approaches with inadequate modification of CA to the contextual realities of subsistence farmers. If African agricultural systems are to be sustainably intensified, we find a need for greater flexibility within extension systems in the pursuit of sustainable intensification. If extension systems are to persist with CA, it will need to be promoted through more transitional pathways that disaggregate the CA package, and with that there is a need for the provision of a mandate to, and necessary funding for, more participatory extension services.

## 1. Introduction

Sub-Saharan Africa is the most food-insecure region of the world, with the rate of undernourishment in eastern Africa reaching 31.5% (FAO, 2016). Part of this problem relates to limited agricultural productivity growth (Blein et al., 2013). Paired with substantial population growth (Mountford and Rapoport, 2016), African cereal demand over the next three decades is expected to more than double (van Ittersum et al., 2016) and will need to be addressed without further land degradation (Bai et al., 2008) and in a more variable climate (Jones and Thornton, 2003).

Conservation agriculture (CA) has been proposed as a diversified production system to address these issues via three principles: minimum tillage; stover cover of the soil and legume diversification (FAO, 2014). CA has been at the forefront of research efforts to increase the sustainability and productivity of African smallholder farming systems (Whitfield et al., 2015), with more than five decades of research undertaken in the African context (Wall et al., 2014). While there remains ongoing debate about the benefits and relevance of CA to

African smallholder farmers (e.g. Pittelkow et al., 2015), the drive for CA promotion remains both strong and politicised (Whitfield et al., 2015). Despite this, utilisation by African smallholder farmers remains limited (Andersson and D'Souza, 2014; Brown et al., 2017b; Giller et al., 2009).

To understand this limited uptake, the literature has been dominated by econometric studies that investigate the benefits accrued to farmers from agronomic, environmental and economic perspectives (e.g. Arslan et al., 2014; Bekele and Drake, 2003; Kathage et al., 2015; Ngoma et al., 2015; Pedzisa et al., 2015; Pittelkow et al., 2015; Wall et al., 2014). Such methods often do not identify underlying causes and mechanisms for limited adoption and tend to lack depth in the understanding of constraints (Andersson and D'Souza, 2014). They also tend to assume that non-adoption reflects negative evaluation by farmers, overlooking constraints to farmers in obtaining information (Brown et al., 2017b) and leading to only limited investigation of the functionality of informational exchange mechanisms (Wellard et al., 2013).

There are limited examples of different approaches taken to explore these issues, such as Ndah et al. (2014) with the proposal of the

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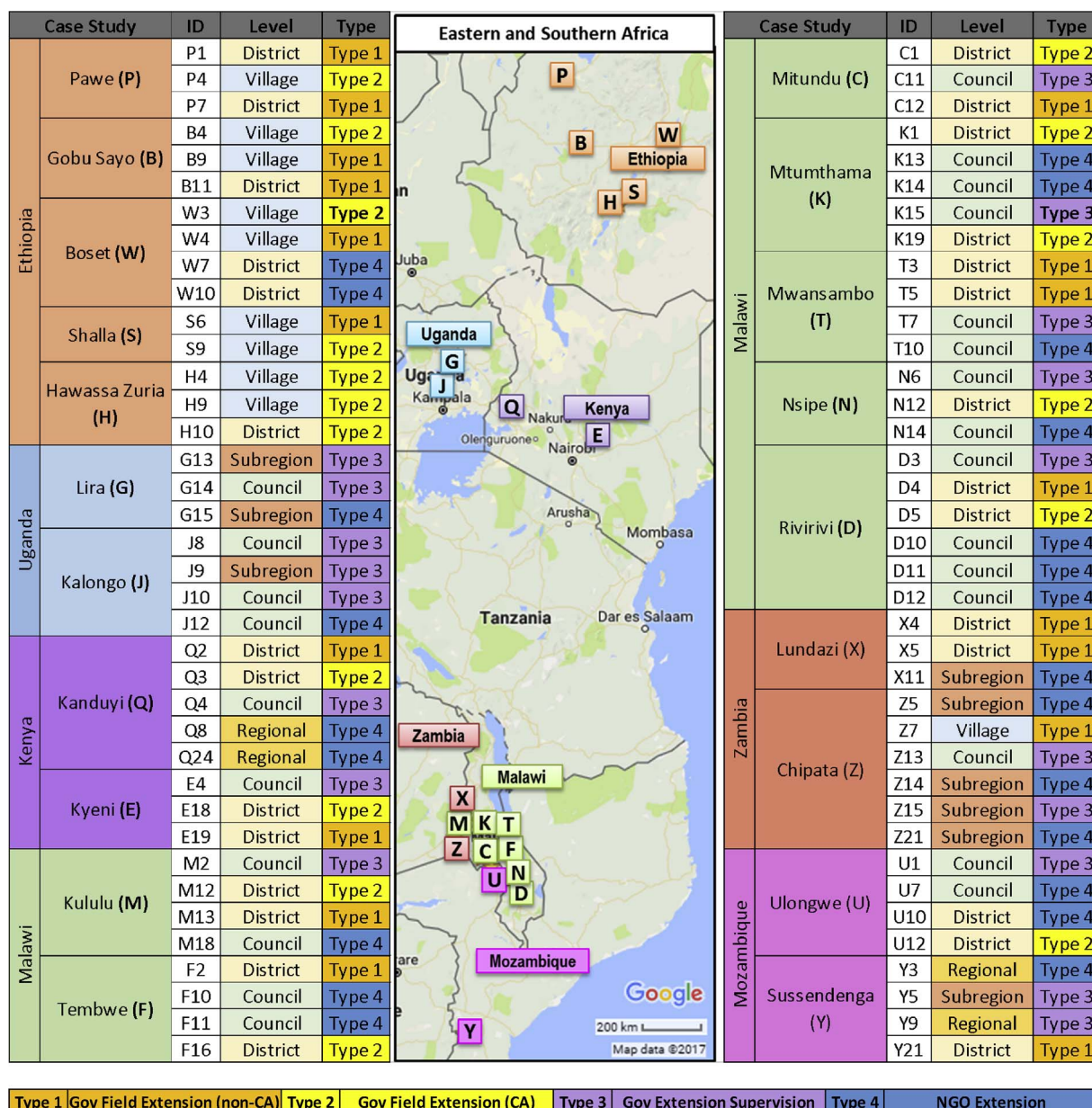


Fig. 1. Location and classification of respondents (map courtesy of Google Maps, 2017).

Qualitative expert Assessment Tool for CA adoption in Africa (QaToCA) which aimed to highlight the relevant factors influencing the potential adoption of CA. In that study, integral constraints were found at the community and institutional levels, yet the constraints identified were not further explored. Indeed, there has generally been limited exploration of African perspectives to understand the feasibility and relevance of CA within local communities (Giller et al., 2009). Exceptions to this include the exploration of farmer perspectives on CA uptake by negative evaluators (Brown et al., 2017a), positive evaluators (Brown et al., 2018a) and those unable to obtain information on CA (Brown et al., 2018b), as well as local African researchers on CA (Brown et al., 2018c). These studies found important constraints within agricultural extension systems in eastern and southern Africa, including strong perceptions of a lack of availability and access, yet these issues remain unexplored from the perspectives of those implementing extension programs. As the implementation of CA systems is knowledge-intensive (Bellotti and Rochecouste, 2014), there is a clear need to explore these perspectives to understand both the reasons for limited CA uptake and more broadly the functionality of current extension mechanisms.

To address this void, this study uses CA as a case study to understand the functionality of current extension systems. This is done through deep qualitative exploration of the perspectives of extension service providers from six countries in eastern and southern Africa. Extension service providers continue to be the main conduit for agricultural information within rural African communities and their experiences and perspectives are integral to understanding the current status of CA utilisation in eastern and southern Africa. In doing so, we note that each individual community in this study has a unique context for CA utilisation, as does each individual farmer. Whilst acknowledging this, our paper aims to explore common factors that exist across communities.

Although Knowler and Bradshaw (2007) concluded that there are few if any universal variables to explain adoption, they excluded regions where non-mechanised farming was practiced and did not include any studies from eastern and southern Africa. There is therefore justification to explore commonalities within the non-mechanised smallholder systems of eastern and southern Africa. As such, we explore the research question: what commonalities exist across African smallholder

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