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Understanding (non-) adoption of Conservation Agriculture in Kenya using the Reasoned Action Approach

Freddy J. Van Hulst[a,*], Helena Posthumus[a,b]

[a] Natural Resources Institute, University of Greenwich, Chatham Maritime, ME4 4TB, United Kingdom
[b] Royal Tropical Institute, Postbus 95001, 1090HA Amsterdam, The Netherlands

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ABSTRACT

In recent years, Conservation Agriculture has been promoted in sub-Saharan Africa as an alternative farming system for smallholder farmers to address declining soil productivity and climate change. CA has to be tailored to the agro-ecological and socio-economic context of smallholder farmers to achieve impact. But even if there is a 'perfect fit', the farmer still has his or her own reasons to choose whether to switch to CA or not. This paper explores the reasons why farmers choose for CA or conventional farming, using the Reasoned Action Approach. Based on findings from a recent study in Kenya among CA farmer field school members and their neighbours, the farmer's decision making is analysed by distinguishing three elements in the decision-making process: the farmer's attitude towards CA, the farmer's perception of the social norms towards CA, and the farmer's perceived behavioural control (PBC) over practicing CA. Strong evidence was found that attitude and PBC are contributing to intentions to adopt CA practices. It is concluded that experimentation and learning are key to support intentions and adoption of CA, because they contribute both to realistic attitudes towards CA and an improved perceived behavioural control.

1. Introduction

Conservation Agriculture (CA) has been promoted in sub-Saharan Africa in recent years to improve food security and adapt to climate change, in particular erratic rainfall and more frequent droughts (Tittonell et al., 2012). In order to achieve such an impact, CA has to be tailored to the agro-ecological and socio-economic context of smallholder farmers (Giller et al., 2011, 2009; Knowler and Bradshaw, 2007). However, even if the CA system would have a perfect fit, the choice to adopt CA or other agricultural practices has to be made by the smallholder. While respecting this freedom, it is important to understand the reasons why farmers apply certain farming practices that they do in order to support food security in a sustainable manner.

1.1. Understanding the adoption of CA

Technology adoption is often assessed with a dichotomous variable (e.g. Corbeels et al., 2013), or the level or intensity of adoption (e.g. Mazvimavi and Twomlow 2009; Arslan et al., 2013). As such, only the outcome of a decision-making process is measured. Some argue that, before deciding on the adoption of a technology (e.g. soil conservation practices), a farmer undergoes a–not necessarily linear–process of different phases. These include a cognitive phase where problem/opportunity recognition and awareness are key, a normative phase where ability and willingness are key, and a 'conative' phase where experimentation and continued use of a practice are determined (De Graaff et al., 2008; Ellis-Jones and Mason, 1999; Prager and Posthumus, 2010). In the case of CA, tangible benefits are typically achieved after several years of implementation (similar to soil conservation practices), making the cognitive and normative phase of the adoption process more important. It requires commitment on the side of the farmer to change the farming system to CA before potential benefits are achieved.

Many factors have been found that potentially influence the uptake of agricultural technologies and practices by smallholders in each phase, including the features of the technologies (such as their profitability, level of complexity of use, level of investment required, and compatibility with the overall farm management etc.), the features of the household (such as available labour, wealth, gender, innovativeness, attitudes, off-farm commitments, etc.), the features of the farm fields (such as soil type, steepness of slopes, degradation status, total area etc.), and various external factors (such as land tenure security, access to markets, available

* Corresponding author at: Natural Resources Institute, University of Greenwich Central Avenue, Chatham Maritime, Kent ME4 4TB, United Kingdom.
E-mail addresses: fjvanhulst@mail.com, f.j.vanhulst@greenwich.ac.uk (F.J. Van Hulst).

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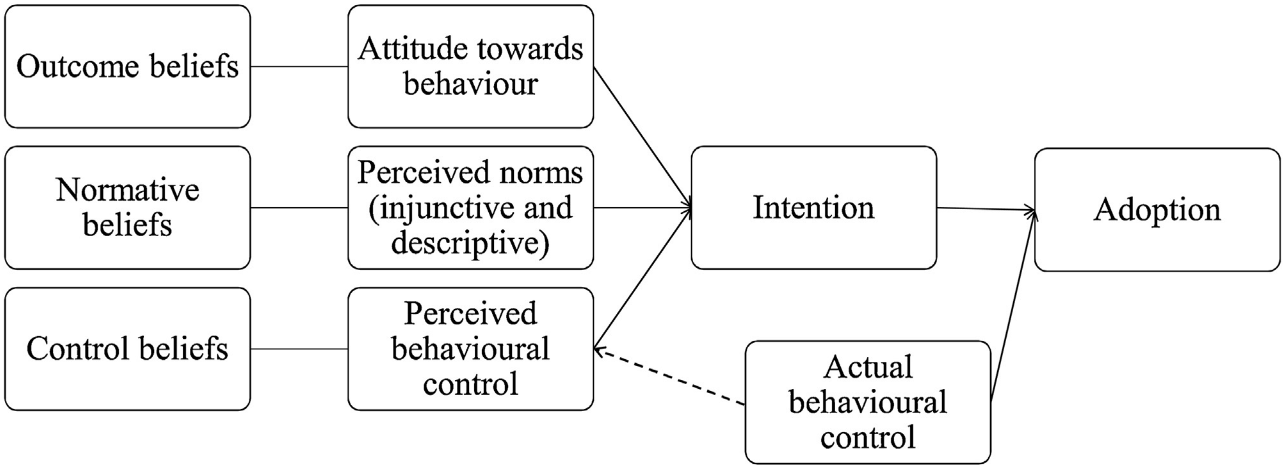

Fig. 1. Simplified model of the Reasoned Action Approach. Based on Fishbein and Ajzen (2010).

extension, infrastructure etc.) (see for example Ervin and Ervin, 1982; Feder et al., 1982; Lynne et al., 1988; Sinden and King, 1990; Wilson, 1996; Posthumus et al., 2011, 2010).

More specifically to the adoption of CA in sub-Sahara Africa, an important constraint is the limited availability of crop residues for mulching (e.g. Baudron et al., 2013). Also, it has been observed that CA may increase the labour requirements for weeding, especially if no herbicides are used (Chauhan et al., 2012). Others point at the limited attention for intra-household relations and gender in the adoption process (e.g. Beuchelt and Badstue 2013). The importance of a supporting institutional environment is also considered important, especially after the widespread adoption of CA in Brazil could be linked to the success of 'innovation networks' and close links with agrochemical companies (Gowing and Palmer 2008). A self-assessment tool applied in Kenya and Tanzania identified limited access to in- and output markets, adapted CA equipment, and reliable extension services as major hindering factors for the adoption of CA (Ndah et al., 2015). And although CA can be linked with higher yields and lower production costs (e.g. Mazvimavi and Twomlow 2009), it often takes several years before the benefits of CA become available (Hobbs et al., 2008).

Despite these insights, a critical reflection on the role of the 'adoption study' seems justified. The increasingly popular Innovation Systems perspective on agricultural development (Hall et al., 2007; Posthumus et al., 2011), has important implications for the role of adoption studies. Rather than giving feedback to one key actor who pursues technology adoption through a linear process of dissemination, the adoption study ideally considers and feeds back to many actors, bringing new understanding and inspiring the partnerships between them (Röling, 2009; Röling et al., 2012). In their review on farmers' adoption of CA, Knowler and Bradshaw (2007) show that there are no universally significant factors that affect Conservation Agriculture adoption, although financial viability and social capital seem to be two key factors.

Andersson and D'Souza (2013) point out that current CA adoption studies are often methodologically weak, biased by the promotional project context in which they are often carried out, and prone to inherent limitations of farm-scale analyses of standard household surveys. Instead of only establishing a correlation between adoption and independent variables, it is important to conceptualize *how* a factor has an influence on adoption (Beedell and Rehman, 2000). Because of the multi-layered and complex nature of farmers' livelihoods objectives and related decision making, profit-maximising economic models are intrinsically limited in achieving that end (Lynne et al., 1988). And although there has been an increasing interest in motives, values and attitudes that determine the decision-making processes of individual farmers, there is a tendency within some studies to revert to an over-simplistic model of the attitude–behaviour relationship (Burton, 2004). He suggests that studies of various behaviours can improve by using concepts from social-psychology, especially the Reasoned Action Approach (RAA, Fishbein and Ajzen, 2010) seems worth exploring.

1.2. ABACO project

The EU-funded ABACO (agro-ecology based aggradation-Conservation Agriculture) project (2011–2015) for semi-arid regions emerged as a need for action to promote CA, bringing together a large number of partners working on CA in Africa, including those from international and national research centres, and the African Conservation Tillage (ACT) network. ABACO aimed at establishing site-specific co-innovation platforms to develop and promote CA practices that rely on agro-ecological principles and aggradative measures to restore soil productivity in semi-arid regions of sub-Saharan Africa (Tittonell et al., 2012).

1.3. Conservation Agriculture in Kenya

CA has been introduced to Laikipia county in Kenya, the study area, through several projects starting in 1997, mostly by means of extension, training and the forming of Farmer Field Schools (FFS) (Kaumbutho and Kienzle, 2007). The FFS members were introduced to CA in 2007–2008 during the CA-SARD research project. The ABACO project established demonstration plots with the FFS members to experiment with, and evaluate, a number of different treatments based on the CA principles of 1) minimum soil disturbance; 2) permanent soil cover; and 3) crop associations and rotations.

Some farmers experiment with potatoes under CA, but the majority of farmers apply CA to their maize crop. Mulch is mainly realised from crop residues and sometimes supplemented with tree branches and grasses, while cover crops are realised with Dolichos (*Dolichos lablab*), Butter Beans (*Phaseolus coccineus*) or Pigeon Peas (*Cajanus cajan*). For conventional land preparation mechanical or manual ploughing is done, while under CA most farmers first slash the weeds manually, then do manual or animal-drawn ripping and direct planting, and spray a Glyphosate-based herbicide (mostly Weedall) (Min. of Agr., 2013). Conventional weeding is done with a *fork jembe* (which turns the soil) while many CA farmers do 'shallow weeding' with a *panga* or a specially designed *shallow weeder*.