The concept of the Qualitative Expert Assessment Tool for CA Adoption (QAToCA)

MANUAL/WORKING PAPER

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Introduction

Conservation Agriculture (CA) is a concept whose applicability relies on simultaneous application of three basic principles: 1) Minimum soil disturbance or no tillage; 2) Permanent soil cover; and 3) Crop rotations/associations (Giller et al. 2009; Hobbs 2007; Lahmar 2010; Thiombiano and Meshack 2009). It specifically aims to address the problems of soil degradation resulting from agricultural practices that deplete the organic matter and nutrient content of the soil hence leading to higher crop yields and lower production costs. CA therefore is a combination of tested scientific technologies, and its practice in Africa is now maturing with increasing demand for more sustainable agricultural practices and better natural resources management and conservation (Thiombiano and Meshack 2009).

In spite the widespread claim of CA as a solution for the problems of poor agricultural productivity and soil degradation in Africa, empirical evidence is not clear and consistent on many of these points nor is it always clear which of the principles of CA contribute to the desired effects (Giller et al. 2009). Despite the publicity claiming widespread adoption of CA, studies have revealed that farmers do not adopt all components of CA due to various reasons such as limited access to inputs (herbicides, cover crop seeds), labour constraints, or insufficient resources, e.g. (Baudron et al. 2005; Giller et al. 2009). Apart from these constraints, the poor infrastructure, the small farm size and the low educational level have been considered to be major constraints to the promotion of CA. Available evidence therefore suggests virtually no up-scale of CA in most African countries. However, it is acknowledged that the potential of CA is site-specific and depends on the local biophysical, socio-economic and cultural environment (Erenstein 2002). To this effect, it is concluded that there is an urgent need for a critical assessment under which ecological and socio-economic conditions CA is best suited for smallholder farming in Africa (Giller et al. 2009) and its regional potential for scaling up. Conservation Agriculture to Africa (CA2Africa) is an EU-funded Project (2010-2013) which aimed at filling this knowledge gap with the main objective of 1) Analyzing 2) foreseeing and 3) Comprehending the adoption of CA in Africa.
Therefore, a Qualitative Expert Assessment Tool for CA Adoption (QAToCA) was designed that tries to assess the socio-economic conditions that hinder or promote the adoption of

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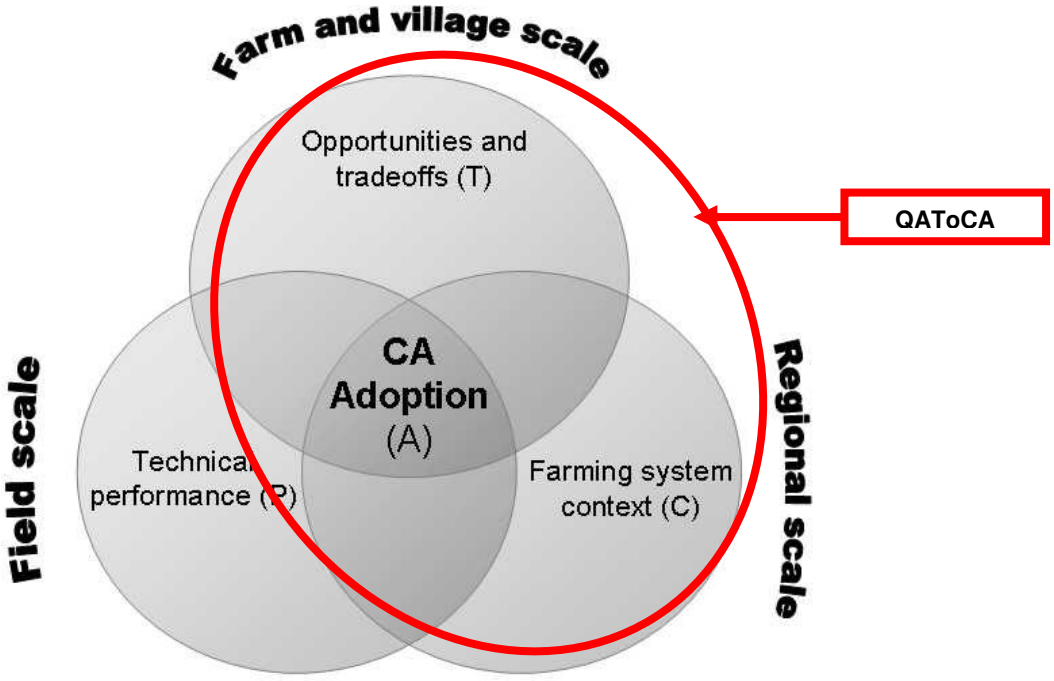
Conservation Agriculture. This paper provides a brief description of the background and the content of this tool.

CA2Africa scales of implementation and QAToCA

In order to meet the above described objectives, the project makes use of a conceptual framework that distinguishes three scales of analysis: field, farm and village, as well as regional levels (Fig 1). Each scale has its own analytical tools or models. The performance of CA at field scale is assessed using biophysical crop/soil models. At farm and village scales, trade-offs in the allocation of resources is analysed using bio-economic farm or household. At the regional scale, i.e. the context or external environment, conceptual models and adoption theories are first reviewed as frameworks and then specific questions from these frameworks translated in form of thematic questions to form a Qualitative Expert Assessment Tool for CA Adoption (QAToCA). QAToCA therefore, is developed as an approach, meant to be used to assess/measure the relative likelihood of CA adoption under the different agro-ecological, socio-economic and cultural conditions of Africa. It is a much more generic and less data intensive approach that complements the mainstream modelling approaches (biophysical and bio-economic models) in meeting the objective of CA2Africa, i.e. analysing and foreseeing the impact as well as comprehending the adoption of CA in Africa.

Fig 1: CA2Africa scales of implementation and QAToCA



$$Adoption = Performance + Tradeoffs + Context + (P \times T \times C)_{interactions}$$

Source: adapted from Corbeels et al (2009) CA2Africa DoW

Adoption (A) is conditioned by its technical performance (P), subject to the opportunities and tradeoffs (T) that operate at farm and village scales and constrained by different aspects of the context (C) in which the farming system operates, including market, socioeconomic, institutional and policy conditions defining the innovation system and the variability inherent to the physical environment.

QAToCA specifically looks at the contextual factors not handle by the models due to their limit of applicability. Its thematic questions cover issues mostly at the regional level but with some overlapping down to farm/Village and field levels (fig 1).

Conceptual Background to QAToCA

Because there are numerous interdependencies in factors influencing the state of CA adoption in Africa, it is important to clarify and prioritise the opportunities and threats for further adoption of CA as well as review innovation processes related to the CA system. That is why in developing QAToCA, the authors had to pay special attention to the CA Adoption context.

To do this in a systematic and logical way, the authors first looked at the theories of adoption and conceptual models of innovation systems and then identify the following work steps by relating the concepts to CA and its knowledge gaps in Africa. Specific relevant knowledge from these theories and concepts is then translated to sets of questions to form QAToCA which serves as a viable tool in analysing the regional adoption likelihood of CA in Africa. The selected reviewed theories and conceptual models used as basis for this tool include:

a) Adoption theories;

- Theory of psychological field; Lewin (1947)
- Theory of Behaviour modification; Albrecht et al (1989)
- Diffusion of Innovation Theory; Rogers (2003)
- The Diffusion Theory: Hohenheim Diffusion Concept; Hoffmann (2005)
- Theory of Planned Behaviour: TPB; Ajzen (1991)
- Dynamics of CA Adoption: DOCAA; Triomphe et al (2007)

b) Conceptual models;

- Innovation System Approach: ISA; Lundvall (2004); Mytelka (2000); World Bank (2006)
- The Innovation Policy Terrain; OECD (1997)
- A Generic National Innovation System; OECD (1997)
- Elements of National Innovative Capacity; Porter and Stern (2002)
- Actor-Network Theory (model); Callon and Latour following Law and Hassard (1999)

[See deliverable report 2.2 for WP2 of CA2Africa: *An inventory of bio-physical, socioeconomic and conceptual models of innovation systems for assessment of agricultural (Innovative) practices]*

Although these reviewed theories and conceptual models have all provided frameworks with potentials for contributing to the CA2Africa project goals, each theory or concept has had its strength as well as limitations. In analysing issues related to "*attributes"* of CA Adoption in Africa with specific focus on how its "*compatibility, observability, relative advantage and complexity*" influence its adoption process, the *Diffusion of Innovation Theory* (Rogers 2003) and *Determinants of Adoption* (Rogers 2003), have been focused on as the most fitting frameworks for this purpose. In conceptualising the possible entry points to CA by individual farmers and potential journeys or pathways through which individual farmers can undertake in the course of CA adoption process, the *Dynamics of CA adoption* (Triomphe et al. 2007) have been identified as the best fitting framework to meet this objective. On the other hand, on examining the evolution (phases) of CA adoption in Africa with an analysis of the categories of CA adopters including their perception and characteristics, the *Theory of Behaviour Modification* (Albrecht et al. 1989), the *Diffusion of Innovation Theory* (Rogers 2003), the *Hohenheim Diffusion Concept* (Hoffmann 2005) have been selected as the most

fitting theories/concepts to serve as frameworks in this regard. With regards to diagnosing the inhibiting and driving forces to CA adoption as well as examining the role of "*farmers and Community's attitude"* towards the Adoption of CA, the *Theory of Behaviour Modification* (Albrecht et al. 1989), the *Theory of Planned Behaviour* (Ajzen 1991) and the *Determinants of Adoption* (Rogers 2003), have been identified as the most fitting frameworks in this regard.

However, a holistic perspective has been employed in looking at CA adoption. Socio-economic factors within the adoption context, the stakeholders involved, as well as the type and quality of linkages between the CA systems have been considered using the conceptual models of innovation systems as frameworks (Lundvall 2004; Mytelka 2000; World Bank 2006). Other closely related concepts include *Innovation Policy Terrain* (OECD 1997), *Generic National Innovation System* (OECD 1997) and the *Elements of National Innovation System* (Porter and Stern 2002). Therefore, based on these identified conceptualising abilities, the listed theories, concepts and models were employed as the basis for deriving the thematic sets of questions that form QAToCA.

Objectives of QAToCA

QAToCA is meant to be use in determining the relative likelihood of CA adoption in the different regional case studies of the CA2Africa project. By considering the concept of adoption from a holistic point of view, the authors intend to achieve this by using QAToCA to specifically answer the following questions:

- *Which region has a higher or lower CA relative adoption likelihood in the CA2Africa case study areas based on the results?*
- *Which thematic area within the CA innovation system or component for the set region/ case study is responsible for the relative state of adoption likelihood?*
- *What are the determinants (driving and inhibiting forces) to this likely state of adoption in the case study areas?*

The tool focuses on a qualitative assessment of all the factors (mostly at the higher or regional level) that influence the adoption of CA. The results give a relative indicator for likelihood of adoption. Relative since it produces a percentage which gives not necessarily the likely actual extent of adoption but can form a major base towards the understanding of driving and inhibiting factors for CA adoption under the different socio-economic and agro-ecological conditions of Africa.

Development Philosophy and methodology

Considerations:

- *Acknowledging the usefulness of the reviewed theories and conceptual models as possible frameworks in analysing the CA adoption process and,*
- *Acknowledging that each of these theories or conceptual models addresses just an aspect or aspects of the CA adoption process,*
- *Considering the difficulties involved in aggregating the reviewed theories and conceptual models under a single generic framework which could be best used in analysing the CA adoption process as well as CA innovation system,*

- *Acknowledging the difficulties involved in obtaining quantified data guided by these theories and conceptual models in analysing the adoption of CA in Africa,*

To this effect, all the issues identified and conceptualised by above listed theories and conceptual models have been translated into sets of thematic questions to form **QAToCA.** QAToCA has been developed on the basis of these reviewed adoption theories and conceptual models, coupled with inspiration from the ScalA -Tool (Tool for the assessment of sustainability, climate relevance and scaling-up potential of project approaches), developed by Bringe et al (2006), tested and used by GTZ (http://www.gtz.de/) and Sustainet (http://wwww.sustainet.org/). Further consultation and feedback collection from pretesting of the Tool in Tanzania, Zimbabwe, Burkina Faso, Madagascar and Tunisia amongst CA experts within the CA2Africa project partners have been integrated in the development process of the Tool.

Design and overall structure

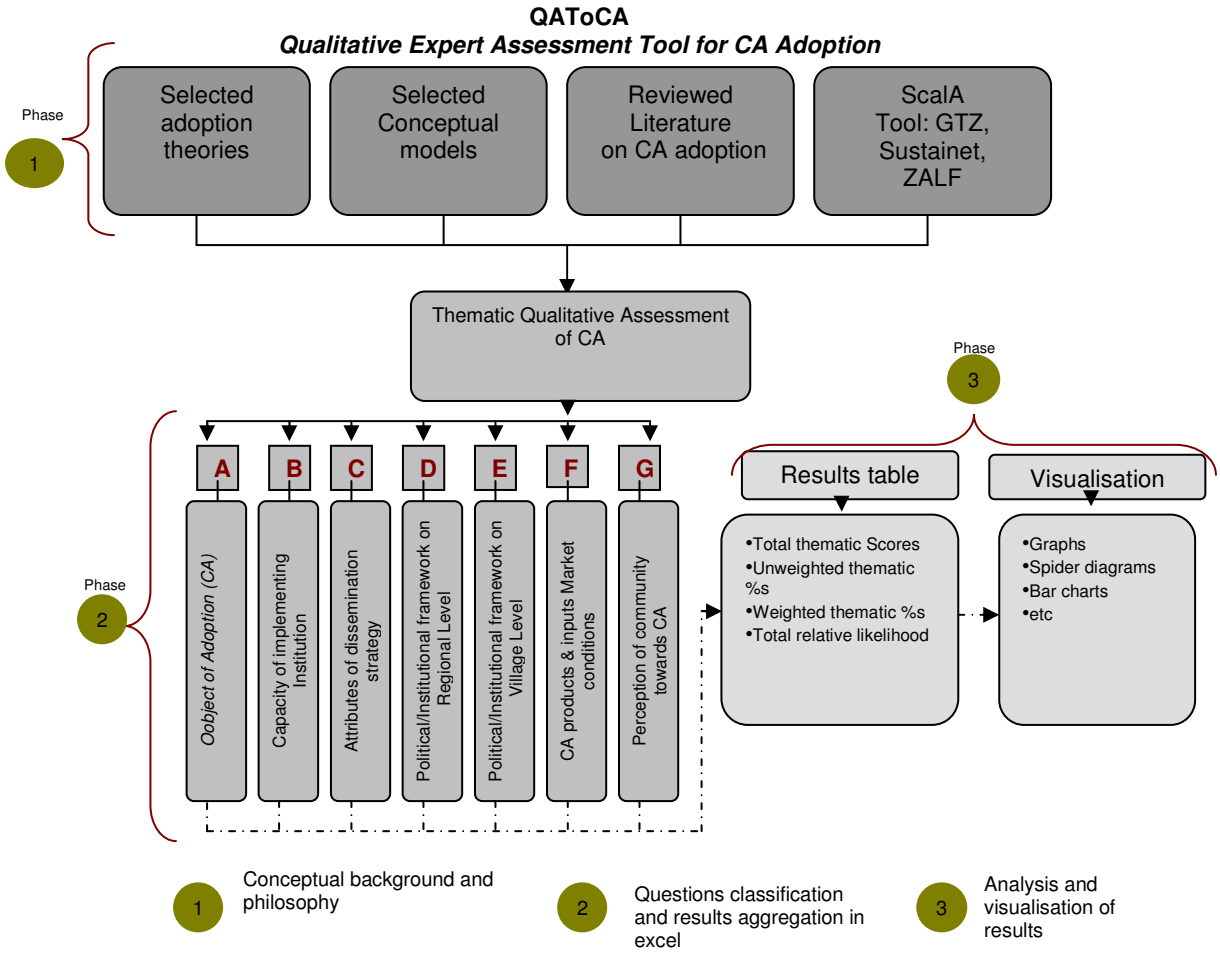
Guided by a holistic and systems thinking concept towards looking at adoption, QAToCA questions have been grouped under specific thematic components with a careful consideration of the differerent scales of implementation within the CA2Africa project from farm level to village/local and regional levels as follows:

Box 1: Thematic areas of QAToCA

A	CA as an Object of Adoption (ObjofAdoptFarmVillLev)
B	Capacity of implementing institution (CapacityofImplInstVillRegLev)
C	Attributes of dissemination strategy (AttrOfDissemStraVillRegLev)
D	Political/Institutional framework on Regional Level (PolInstFramRegLev)
E	Political/Institutional framework on Village Level (PolInstFramVillLev)
F	CA products & inputs Market conditions (ProInpMarkCondVillRegLev)
G	Perception of community towards CA (PercepCommVillRegLev)

Each thematic area is accompanied by a set of "*Operational questions"* linked to "*Indicators for assessing scaling up (dissemination) potential"*. Each of these indicators is further linked to *three statements* depicting possible scenarios for the case study and degree of influence over scaling-up likelihood.

Fig 2: Overview of QAToCA approach



Results of entries under each component are aggregated and automatically linked to each other by inbuilt calculation in the excel spreadsheet. Final results are automatically displayed on a result table at the end and then visualised using a spider graph diagram (see fig 2: Overview of QAToCA approach).

QAToCA operational approach and guide

QAToCA scale:

The assessment is based on a scale adapted from the **Lickert scale** (QAToCA Scale) from 0-2, indicating the weight/strength of the suggested statements with respect to their influence on the likelihood of adoption, where:

0=not influential, has no positive effect on adoption likelihood
1=little influence, has limited positive effect on adoption,
2=highest influence, has maximum positive effect on adoption likelihood
N= if you think, none of the statements are appropriate. Please leave a comment in this case

Making a decision:

A decision is made by choosing one figure from the scale 0, 1, 2 or N (if none of the statements are appropriate) and filling it in the empty box under (v). Once this is done, this implies the respondent has agreed that the statement in (iv) represented by the selected figure (iv) is closest to the observed situation in his region.

Example:
For instance, for **A1 in ObjofAdoptFarmVillLev**, by selecting "**2**" will imply that in my case, the statement ……

"*There is sufficient own financial resources by farmers to cover cost"* is closest to the observed situation in the respondent's region (Fig. 3).

Fig 3: Example of how to fill in QAToCA

	(i)	(ii)	(iii)	(iv)	(v)	(iv)
A1	Is CA affordable by farmers in terms of cost?	Cost of CA and Liquidity issue	There is sufficient own financial resources by farmers to cover cost	2	2	
			They can assess loans at reasonable interest rates and credit institutions are available	1		
			They need major financial assistance from the promoting organisation and credit instutions are absent	0		

For all selected weights (0, 1 or 2) in relation to respective questions in each set, there is an automatic summation of the total at the end of the excel sheet. This sum is further linked to the overall total at the final results sheet of QAToCA. In this regard, not only the overall relative adoption likelihood for a specific case study is determined, but the specific thematic areas responsible for the final results can be easily detected and tentative conclusions drawn.

Conclusions

To better understand the relatively slow rate of CA adoption under the different agro-ecological zones of Africa, there is a need to use modelling approaches to best analyse the interactions of determinants at both field, farm and village levels. CA2Africa aims at analysing and foreseeing the impact as well as comprehending the adoption of CA in Africa using modelling approaches. However, such modelling approaches (biophysical and bio-economic models) are apparently mostly useful in meeting the objects at the field and farm level, but their limit of applicability becomes glaring when it comes to analysing regional and contextual issues influencing the adoption of CA. Less data intensive approaches such as conceptual models based on adoption theories are therefore seen to be most fitting in dealing with such factors. Because of the need to determine a) the likelihood of adoption, b) the specific hindering and driving factors as well as c) the contribution of specific components of CA system in quantitative terms, the QAToCA tool has been developed within the context of the CA2Africa project to serve this purpose. The tool is a direct output of selected questions from adoption theories and conceptual models as well as a literature review coupled with inspiration from the ScaLA tool developed and used by researchers of ZALF, GTZ and Sustainet. After a pre-test in Tunisia, Madagascar, Tanzania, Zimbabwe and Burkina Faso, suggestions for improvement from various CA experts have been integrated and the tool is now ready for use in determining the relative likelihood of CA Adoption in Africa.

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