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Limits to the applicability of the innovation platform approach for agricultural development in West Africa: Socio-economic factors constrain stakeholder engagement and confidence

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ABSTRACT

Integrated Agricultural Research for Development (IAR4D) is a mode of participatory action research for development that aims to improve the well-being of smallholder farming households by facilitating networks between farmers and marketplace actors through groups called 'innovation platforms'. In 2012, the Association for the Promotion of Livestock in the Sahel and Savannas (APESS, an NGO with rural membership) established nine innovation platforms in the Sahelian zone in Senegal, Burkina Faso, Cameroon and Chad, with the aim of engaging member livestock producers with meat and milk processors and traders. In late 2013 and early 2014, each innovation platform reviewed its perception of "performance" or "functionality", using a consensus-based group assessment scored against nine criteria. The aim of this study is to test the extent to which perceived functionality was related to the activities of the innovation platform, as well as current farm productivity and profitability, household well-being, and regional context, using data gathered independently by APESS as part of its broader mandate to improve the lives of members.

Across the nine innovation platforms, there were strong positive correlations between the responses to all self-assessment criteria i.e. members perceived that their innovation platform was performing strongly or weakly in all respects. The criterion scores were correlated positively with the number of meetings held, but not with numbers or gender of attendees, training opportunities, nor actions agreed at meetings. Innovation platforms self-assessed more positively in southern, higher rainfall regions than in the northern, lower rainfall regions. Performance was positively correlated with many measures of farm productivity and household well-being, including median area of farms, value of crop and hay production, sales of animals or animal products, expenditure on agricultural inputs, current engagement with markets, and estimated number of months per year that the family is able to feed itself.

We conclude that the IAR4D approach is perceived to work well in high rainfall zones, for smallholders with a relatively high current level of well-being, who have larger and more productive farms, and who are already engaged with markets. The approach does not appear to work well in more arid regions for poorer smallholders, who are often not able to provide food for their families for 12 months of every year. The IAR4D focus on social networking into markets appears to be relevant for producers who wish to strengthen or diversify existing market relationships, but is not perceived to be sufficiently relevant by smallholders for whom achieving reliable subsistence and averting starvation remains the priority.

1. Introduction

The "first" Green Revolution is generally regarded as having bypassed or failed sub-Saharan Africa (McIntyre et al., 2009; Pingali, 2012), in sharp contrast with eastern and southern Asia and with South America. During the period 1960–2007, and even more recently, production of most types of agricultural commodities in sub-Saharan Africa on a per unit area or per unit labour basis showed no substantial trend or, in the worst cases, declined (Pretty et al., 2011). Food supply for the growing human population has been met primarily by increasing the area of land under cultivation each year and/or decreasing the duration of fields' fallow periods in proportion to population, a strategy that both fails to increase per capita production at the level of households, and in the long term has an ecological absolute limit. In east and south Asia,

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the area under cultivation has increased relatively little since 1960, but yields per unit area have increased through an intensified agricultural model based on the use of improved varieties, irrigation, fertilisers, herbicides, and pesticides, which has ultimately flowed through to decreased poverty (Pretty et al., 2011).

The food system *sensu lato* at national, regional or global scales is highly complex, and many political, social, cultural and technical factors may provide opportunities and constraints for agricultural production (for example, see Pinstrup-Andersen and Watson, 2011, Poulton, 2014). However, one school of thought lays the blame for the lack of growth in productivity in sub-Saharan Africa squarely at the feet of researchers or, more specifically, the interface between research technologies and producers. The so-called "linear model of technology transfer", in which the extension agencies of governments mediate in a uni-directional manner between researchers and agricultural producers, is widely perceived to have failed in sub-Saharan Africa and to be a source of failure in technological uptake (Chambers et al., 1989), with the factors that meant that linear tech transfer was not successful in sub-Saharan Africa, while it seemed to succeed in Asia and South America, identified as insufficient and inadequate services and supporting institutions (Hounkonnou et al., 2012).

Reflection upon the causes of the apparent failure of linear tech transfer in Africa led to a search for an alternative model, which converged upon more participatory processes in which agricultural producers are directly engaged in two-way conversation with researchers (e.g. Byerlee, 1998), so that researchers better understand the context and needs of producers, and the producers are able to participate directly in research activities and receive more targeted, nuanced and relevant information from researchers and experiments alike. Many authors have subsequently extended the notion of participatory agricultural research to include entire agricultural "innovation systems" consisting of researchers, producers, merchants engaged in all aspects of agri-business, financiers, and consumers (Hall et al., 2001, 2004, 2006, Clark, 2002, Sumberg, 2005, Hall, 2011, Rajalahti et al., 2008, Hawkins et al., 2009, Nederlof et al., 2011, Sanyang et al., 2014, Sanyang et al., 2016). This field of development practice is now sufficiently well advanced and embedded in international development efforts for experts to be asking questions of the range of nuanced opportunities and constraints that are becoming apparent (e.g. Thiele et al., 2011, Mulema and Mazur, 2016, Schut et al., 2015).

Management of scope-creep associated with uncritically expanding to encompass the full diversity of participants within food systems has demanded more exact specification of the foci and conceptual underpinnings for participatory agricultural research. Thus, with a specific interest in enhancing market engagement by producers, FARA developed a particular brand of participatory research and innovation in sub-Saharan Africa that focuses on integration along "market value chains" and coined the term "integrated agricultural research for development" (IAR4D) for its concept (Hawkins et al., 2009). In IAR4D, the participatory groups focused on value chains are called "innovation platforms" and are encouraged to include the combination of producers, input suppliers, transporters, wholesalers, retailers, manufacturers, credit suppliers and government policy and implementation staff most relevant to the problem or "entry point" that catalyses engagement (Adekunle and Fatunbi, 2012). This definition of innovation platforms is much more specific than some recent usage in which the term has been used to describe almost any participatory planning or problem-solving initiative and its tools (e.g. Anttiroiko, 2016; Ojasalo and Tahtinen, 2016).

In its operational plan 2008–2013, the West and Central African Council for Agricultural Research and Development (CORAF/WECARD), the agricultural research and development agency of the Economic Community of West African States (ECOWAS), adopted IAR4D as the best-bet approach to systemic innovation for agricultural development in West and Central Africa and sought international aid donors to support IAR4D-based research. During 2011–2014, with funding from the Australian Department of Foreign Affairs and Trade, and in partnership with Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO), CORAF/WECARD established a programme of six multi-country projects that took IAR4D and innovation platforms as central methodological tools to address improvements in aspects of crop and livestock production. Given the explicit selection criteria for the funding programme, the design of these projects all applied IAR4D principles, making the assumption that IAR4D is a more impactful approach to research for development than, say, linear technology transfer, even though success of IAR4D had not been demonstrated rigorously at the time of project initiation in 2011. Literature published during the period of project implementation has been inconsistent about the relative benefits of IAR4D (e.g. Adekunle et al., 2012, Nkonya et al., 2013, Sanyang et al., 2013, Siziba et al., 2013, Pamuk et al., 2014, Sanyang et al., 2014, Pamuk and van Rijn, 2015, Adjei-Nsiah and Klerkx, 2016, Sanyang et al., 2016) and further examination of the potential advantages and benefits remains critical before future faith in the approach can be considered secure.

One CORAF/WECARD project was coordinated by the Association for the Promotion of Livestock in the Sahel and Savannas (APESS). Formed in 1989, after the extended Sahelian drought of the 1970s and 1980s, APESS is an international-funded, member-based association that works towards improved environmentally and economically sustainable animal husbandry practice by traditional herders and for greater involvement of animal producers in the economic, political and social development of West African countries. The project focused on opportunities for enhanced meat and milk output and profitability by animal producers in nine case studies in the Sahel. Due to time, space and financial constraints of the project, formal testing of the hypothesis that IAR4D is a more effective means of communicating information and facilitating innovation in the agricultural sector *sensu lato* than other approaches to agricultural innovation (such as the linear model of technology transfer) was not feasible. It was not possible to compare independent locations, groups in the agricultural sector and entire market value chains under conditions of IAR4D and one or more other approaches to innovation in production and market systems. Furthermore, the two-year period after formation of the innovation platforms was not sufficient to find durable innovation adoption amongst producers and their markets, as concluded previously by Triomphe et al. (2013).

Nevertheless, across the nine innovation platforms established during the project, there was sufficient variation of experience to permit testing of three secondary hypotheses about whether the management and activities of the innovation platform or the circumstances of the participants beyond the innovation platform per se determine the functionality of innovation platforms perceived by participants, where "functionality" is defined as the merit, value, usefulness or success of the experience for participants given their expectations and needs:

H1. *Functionality of innovation platforms is affected by the number of meetings, the number of training activities and/or the number of production and value chain actions agreed and undertaken, including the number of people and the gender representation under each of these activities.*

H2. *Functionality of innovation platforms is affected by the production system, socio-economic circumstances and well-being of the families of the producer members.*

H3. *Functionality of innovation platforms is affected by regional characteristics external to the situation of individual members such as agro-ecological zone (here indexed as mean annual rainfall) and local population density.*

In this paper, we test these specific secondary hypotheses as de facto tests of the primary hypothesis about the efficacy of IAR4D, cognisant of the requirement for the additional assumption that participant-perceived functionality of innovation platforms is an indicator of likely effectiveness in terms of potential future adoption of innovations in