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Scaling up agricultural interventions: Case studies of climate-smart agriculture

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ABSTRACT

If climate-smart agriculture (CSA) is meaningfully to address the development challenges posed by climate change, effective approaches will be needed to scale up research findings. Here, eleven case studies are used to exemplify scaling-up strategies based on (1) value chains and private sector involvement, (2) information and communication technologies and agro-advisory services, and (3) policy engagement. We evaluated these case studies and the scaling strategies they exemplify, using a simple conceptual framework from the field of scaling up nutrition interventions. Results showed that these different strategies exhibit different characteristics; all offer considerable potential for taking CSA interventions to scale, but there still may be unavoidable trade-offs to consider when choosing one strategy over another, particularly between reaching large numbers of farmers and addressing farmers' specific contexts. The case studies highlighted several challenges: estimating the costs and benefits of different scaling activities, integrating knowledge across multiple levels, and addressing equity issues in scaling up. The case studies outlined here will continue to be monitored and evaluated, thus strengthening the evidence base around effective scaling-up strategies that can contribute to achieving food and nutrition security under climate change in the coming decades.

1. Introduction

All over the world, research on and dissemination of agricultural technologies and practices is pursued as an intervention to raise agricultural production, improve livelihoods and alleviate poverty for small-scale farmers (Kilima et al., 2010). Research in improved crop varieties, better farming methods, participatory policy analysis and new knowledge generation has contributed substantially to development impacts (Raitzer and Kelley, 2008; World Bank, 2011). The developing regions overall saw a 42% reduction in the prevalence of undernourished people between 1990 and 1992 and 2012–14 (FAO, 2014). But there are large regional differences: progress against poverty and hunger has been limited in South Asia, for example, and has gone backwards in sub-Saharan Africa since 1990–1992 (FAO, 2014). About 815 million of the > 7 billion people in the world, or one in nine, are estimated to be suffering from chronic undernourishment (FAO, 2017), almost all of whom are living in developing countries. Climate change adds considerable urgency to the situation, as it may massively disrupt food systems, posing population-wide risks to food supply. Funding and political will are needed to support developing countries to contribute to the Paris Agreement to reduce greenhouse emissions in order to limit global warming to well below 2 °C. At the same time, future demand for food must be met, while increasing the adaptive capacity of small-scale farmers and increasing resource use efficiency in agricultural systems (Lipper et al., 2014). Opportunities abound, but there are many barriers that may constrain the uptake of appropriate interventions at the scale required.

The concept of climate smart agriculture (CSA) offers a suite of approaches for transforming and reorienting agricultural systems to support food security in the face of climate change, by focusing on the

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potential synergies and trade-offs between agricultural productivity and food security, adaptive capacity, and mitigation benefits (Campbell et al., 2014). Incremental change may be inadequate to bring about the societal changes needed to mitigate and adapt to climate change and enhance food security (Biermann et al., 2012), particularly in the longer term as the impacts of climate change become increasingly obvious (Rickards and Howden, 2012; Cooper et al., 2013). In addition to the need to move beyond small, incremental changes, there is also a need to move from working with small numbers of farmers to achieving outcomes among large portions of the farming population, in efficient and effective ways.

Many agricultural technologies and practices, including those qualifying as CSA, are not achieving their full potential impact because of low levels of adoption by farmers in developing countries. Despite successful pilot projects, uptake of new and innovative agricultural technologies and practices has often been poor, and we have still not been able to resolve problems of food insecurity and rural poverty. It is this need to show real impact beyond the plot or site level to impacts on more people over wider areas, and on institutions and policies, that drives the interest in scaling up (Pachico and Fujisaka, 2004). The key issue is how to scale up promising pilot initiatives so that they can have a substantial impact on poverty (Wigboldus et al., 2016). For simplicity, we use the term "scaling up" to capture a number of processes. Scaling up brings more quality benefits to more people over a wider geographical area, more quickly, more equitably, and more lastingly (Franzel et al., 2001). Scaling thus refers to the benefits brought about through the intervention not only in terms of the number of people and the geographical area but also in terms of time and equity scales (Pachico and Fujisaka, 2004).

The main question this paper seeks to address is what are the advantages and disadvantages of specific approaches that hold out promise for scaling up CSA research findings to contribute meaningfully to the challenges of poverty and climate change. The aim is to build on the existing agricultural adoption and CSA literature to unite the concepts under a common framework and draw from the learning to inform future actions. We draw on eleven case studies that were selected from a portfolio of CSA projects undertaken by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS; Förch et al., 2014), a program currently entering its ninth year and working across five regions with a total annual budget of approximately $60 million. The case studies exemplify three strategies, discussed in Section 2 below, to scaling up based on (1) value chains and private sector involvement, (2) information and communication technologies (ICT) and advisory services, and (3) policy engagement. The case studies were chosen as a way of conducting learning within the program and drawing lessons from a range of different situations. The case studies were analysed using a simple conceptual framework, described in Section 3, originally developed for scaling up nutrition-related interventions in developing countries. Results are discussed in Section 4 in relation to how different strategies can help address some of the generic challenges of scaling up to reach development outcomes concerning food security. We conclude with some reflections on remaining challenges to the scaling-up of CSA to meet development targets.

2. Background on scaling strategies

An extensive literature exists on the challenges of adoption of agricultural technologies, and many plausible reasons can be advanced for low rates of uptake (Glover et al., 2016). For example, promising technologies may require small-scale farmers to have access to markets and credit (Shiferaw et al., 2015) and to appropriate information (Mullins et al., 2018). In some situations, policy enablers may be critical for adoption (Jayne et al., 2018). Adoption is sometimes seen as a linear, binary and individual decision when in fact the dynamics are much more complex (Glover et al., 2016). A gap between researchers, policymakers and practitioners continues to exist, despite efforts to disseminate, apply and scale up the results of research (Hartmann and Linn, 2008). Attention is being increasingly paid to the role of intermediaries and innovation brokers who can help to bridge this gap, drawing on many different groups of actors and stakeholders (Schut et al., 2014). The emphasis on the effectiveness of agricultural research to produce adoptable technological options has increased in recent years, in line with long-standing demands for agricultural research to achieve greater impacts and demonstrate its value (Pachico and Fujisaka, 2004). This is not to blur the distinction between research and development; rather, it is about developing explicit strategies that enable next users through partnerships, engagement, capacity development and learning to apply research results in non-research processes, and helping to inform next users as to what makes enabling environments conducive to scaling up and out (Vermeulen and Campbell, 2015). Below, we outline three such strategies that offer potential for achieving this.

2.1. Scaling strategies based on value chains and the private sector

In discussing the concept of value chains, we utilize the generic definition from Orr et al., (2018) of value chain development as "facilitat[ing] the participation of smallholders and small and medium rural enterprises in higher value markets for agricultural and forest products" (p. 14). This concept has become popular among many development actors over the past decade. It broadens the scope of agricultural development from beyond the farm level to encompass the entire market system surrounding food production. There is a body of literature focused specifically on such approaches, and the concept has been divided into four broad strategies, which include improving value chain coordination (both horizontal and vertical), improving process and products, changing and adding functions, and upgrading the institutional environment (Kilelu et al., 2017). We include this diversity of approaches when we discuss value chain development as a mechanism for scaling up climate smart agriculture.

Value chains have two characteristics that make them suitable for reaching a large number of farmers. First, they provide a mechanism for linking multiple actors around a common objective by creating space for dialogue, knowledge exchange and capacity building, and strengthening negotiation capacities. Value chains can act as a delivery mechanism for government and private extension services, credit, and subsidy programmes. Second, they provide market-driven demand (currently, often towards green and more organic products) that may provide a demand-led strategy for adoption of technologies and practices. Scaling up already climate smart value chains or introducing practices and technologies into existing ones may thus be an efficient way to reach large numbers of farmers with reduced transaction costs. However, strategies based on value chains may not be appropriate for the informal sector or for agricultural production for household consumption.

2.2. Scaling strategies utilising ICTs and agro-advisory services

In order to reach more farmers and overcome the high transactions costs incurred by face-to-face interaction associated with conventional extension services, the use of information and communication technologies (ICTs) and associated agro-advisory services is becoming increasingly important. ICTs are being recognised as part of strategies to adapt to, mitigate, and monitor climate change within agricultural innovation systems. The rate of growth of mobile phone technology is particularly striking. In 2009, mobile cellular penetration in all developing countries exceeded 50%, reaching 57 per 100 inhabitants, up from 23% in 2005 (Pretty et al., 2011). By early 2017, it was estimated that there were 960 million mobile subscriptions across Africa, with an 80% penetration rate among the continent's population (Jumia, 2017). ICTs can thus be an effective means for both the public and private sector to improve access to many different types of information (such as