Chapter 12
Building Innovation Systems for Small-Scale Agricultural Activities in Sub-Saharan Africa: Key Success Factors

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ABSTRACT
The failure of agricultural research systems to provide appropriate technologies to enhance competitiveness in small-scale agricultural activities in sub-Saharan Africa has been well documented. Recognising the peculiarities of such activities, this chapter proposes that a system of innovation where; the actors interact with each other; a combination of science- and experience-based mode of learning and innovation is used and; users provide producers of innovations with feedback will produce appropriate innovations for the sector. It is further hypothesized that the success of this system will be dependent on; the number, scope and strength of interactions among actors; brokerage activities; and an initial successful innovation system for downstream activities. The chapter also undertakes a qualitative assessment of the somewhat successful Cassava and the not-so-successful palm oil sectors in Nigeria to highlight the importance of the framework and the differences between successful and ineffective innovation systems.

INTRODUCTION
There has been increasing global demand for agricultural produce, not only for food security, but also by pressures for new sources of feed-stock for renewable energy. Compared with most regions in the world, sub-Saharan Africa shows a lot of promise to be the global basket for agricultural produce. Not only is there an abundance of land in most countries of the region, a majority of the population in the area are engaged in small-scale agricultural activities. Furthermore, there is a ready regional market due to a considerable and growing population in the region. In addition, and barring grave climatic conditions, a greater part of the region, especially the Guinea Savannah is most suitable for rain-fed agricultural
production. It has been reported in several studies that smallholders have an important role to play in the development of African agriculture, not only because they produce about 75% of agricultural products in the area but also because such activities may have a positive impact on the socio-economic indices of practitioners (World Bank, 2009). In spite of the natural resources endowed on the region, agricultural productivity when compared with other regions remains low. For example, cereal yield per hectare in kilograms of harvested land (including wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains) for Nigeria, Kenya, Gabon, Zimbabwe (countries in the west, east, central and south sub-Saharan Africa respectively), Brazil, Thailand and Belgium for the 2010 to 2014 period was 1,537, 1,727, 1,691, 724, 4826, 3022 and 9213 respectively. (World Bank, 2015). In comparison with smallholder productivity, the World Bank (2009) competitiveness indicators showed that the average domestic yield for smallholder cotton production in Mozambique, Nigeria and Zambia for 2007 was 0.6, 0.9 and 0.8 Metric tons per hectare (mt/ha) respectively while that of Brazil was 3.8 mt/ha for large-scale production. The World Bank (2009) report also shows that the domestic yield of Thailand for rice more than doubles the average yield of the 3 aforementioned African countries. Carr (2013) however argues that with adequate inputs such as in fertiliser and seeds, smallholders can be as productive as large farms. The author reports that small-scale farmers in Japan and China have achieved levels of productivity per unit area of land equal to and even higher than large-scale farmers anywhere in the world.

Competitive advantage can be achieved through acts of innovation (Porter, 1990). The diffusion of innovations on a national or regional scale may culminate in increases in productivity and enhance sectoral and regional competitiveness. Increased productivity in agricultural production may be achieved through the adoption of innovations in higher-yielding cultivars, irrigation, fertilizers, pesticides and post-harvest processing technologies and may also help to reduce poverty, enhance food and nutrition security, and support a more inclusive pattern of growth (Africa Progress Report, 2014). However, in spite of the huge investment made in agricultural research in sub-Saharan Africa, small-scale agricultural activities remain characterised by low productivity and practitioners remain among the World’s poorest. Sumberg (2005) qualifies agricultural research in Africa as being out-of-touch with rural realities, not focused on small-scale production, too often interested only in productivity, and neither participatory nor demand-driven. The existence of design-related constraints to technology adoption among women has also been mentioned as a source of gender inequality among small-scale agricultural practitioners in Africa (FAO, 2012). The continent is said to possess the weakest set of agricultural research and extension institutions (Nweke, 2005, FAO, 2012). Because of the aforementioned, technology adoption remains low among small-scale practitioners in the region. For example, Gollin et al. (2005) report that in 2000, adoption of modern varieties of maize was estimated to be 17% of total area harvested in sub-Saharan Africa compared to 90% in East and South East Asia and the Pacific, and 57% in Latin America and the Caribbean. Walker et al. (2014) reveal that the average weighted grand mean adoption level of modern varieties across 20 crops in sub-Saharan Africa in 2010 was 35% which was where Asia, Latin America and the Middle East and North Africa were in 1970s, 1980s and 1990s respectively. Inappropriateness of innovations is a major cause of lack of adoption in the small-scale agricultural activities in the region. For example, Poku (2002) claimed that a major obstacle to the initial adoption of the high-yield Tenera variety of oil palm in some regions of West Africa was that locales reported that the palm oil processed from its fruits were too fatty compared to the wild growing palms. It is therefore imperative that ways be found to increase the adoption of innovations in small-scale agricultural production through the development of appropriate innovations in order to increase the competitiveness of the region.