Chapter 16
Re-Conceptualizing Smallholders' Food Security Resilience in Sub-Saharan Africa:
A System Dynamics Perspective

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ABSTRACT

Smallholder African systems operate in harsh environments of climate changes, resource scarcity, environmental degradation, market failures, and weak public and/or donor support. The smallholders must therefore be prepared to survive by self-provisioning. This chapter examines the nature of vulnerability of smallholders' food security caused by above conditions in the context of system dynamics modelling. The results show that smallholders co-exist whereby the non-resilient households offer labor to the resilient households for survival during turbulent seasons irrespective of the magnitude of external shocks and stressors. In addition, non-resilient households cannot be liberated by external handouts but rather through building their capacity for self-reliance. Using simulation evidence, this chapter supports the claim that in the next decade only resilient households will endure the extreme situations highlighted above. Future research that employs similar systems-based methods are encouraged to explore how long-term food security among smallholders can be sustained.

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INTRODUCTION

Food security systems undergo rapid changes in response to high food demands from the rising population. The world population is estimated to rise by 70% by 2050 (Tsolakis & Srai, 2017) and this creates pressure on the agricultural systems to match future food production needs. This corresponding increase in food production however, is required in an environment of food security stressors such as: food price volatility due to competition of food for feeding and biofuels (Hubbard and Hubbard, 2013; Pruyt & De Sitter, 2008); climate change and extreme weather conditions (Tadesse et al., 2014); and dietary norms characterized by consumption of food beyond physical need (Sage, 2013). In the context of Africa, other challenges to food security systems include; resource scarcity (e.g. land and inputs), environmental degradation (e.g. declining soil fertility, deforestation, and surface water eutrophication), market failures and weak public/donor support and policy initiatives.

In light of the aforementioned food security stressors, poor nations such as those in sub Saharan Africa are likely to be most affected. For instance, the number of people suffering from hunger in sub Saharan Africa only reduced by a small margin from an estimated 239 million in 2010 (Sasson, 2012) to 226 million in 2016 (FAO, 2017). With this decrease of about 13%, there is no doubt that the millennium development goal number one "*to half extreme poverty and hunger by 2015"* could not be achieved. The current emphasis on sustainable development goals (SDGs) with SDG2 focusing on "*ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture by 2030*", provides renewed opportunity for more effective food security interventions to be undertaken. In addition, agricultural led development is fundamental to cutting hunger, reducing poverty (by 70% in rural areas), generating economic growth, reducing the burden of food imports and opening the way to an expansion of export markets (NEPAD, 2002).

The latest commitment to ending hunger and achieving food security in Africa is pronounced in the 2014 Malabo Declaration on "*Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods*". Accordingly, African Heads of State and Government pledged, among other goals, to end hunger by 2025, focusing on the triple targets of increased production, reduced losses and waste and improved nutrition (FAO, 2017).

In essence, food security issues in sub Saharan Africa have equal measures of fears and hopes. The fears are backed by undesired realities such as: un-met commitments, e.g., the 10% national budgets expenditure on agriculture as was agreed under Maputo Declaration of 2003 but has not been realized by majority of the signatory countries (Harvey et al. 2014); an estimated 218 million people are undernourished and about 153 million people aged 15 and above suffer severe food insecurity (FAO, 2016); only about 1.6% farmland is irrigated compared to 40% of farmland irrigated in Asia (Sasson, 2012); 80% of people surviving below the poverty threshold living in rural areas and have increasing difficulties in feeding themselves (Tyler and Grahame, 2013); and so on. On the other hand, the hopes are underscored by cross-sectorial policies and programmes for elimination of food insecurity and hunger such as: African Development Bank's (AfDB) 'Feed Africa' strategy to enhance a competitive and inclusive agribusiness sector that creates wealth, improves lives and protects the environment (AfDB, 2016); having at least 25 million farm households in Africa practicing Climate Smart Agriculture (CSA) as one of the targets set in the Malobo Declaration for 2025; and of course the overarching sustainable development agenda for 2030.