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Modelling Decision-Making to Improve Livelihood of Smallholder Farming Systems

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Abstract

Smallholder agriculture at large is a backbone for a majority of economies in developing countries and an important source for global food and fiber supply. Although the definition of smallholder agriculture is rather vague, these systems are generally characterised by small landholdings, low competitiveness and low market-orientation. A high variation of livelihood strategies of smallholder results in different prosperity and productivity levels. Smallholders have in common that their livelihood strategies are driven by inter-related decisions within an interacting framework of production, consumption and labour allocation.

This study seeks to analyse these interrelated decisions of smallholders by modelling the consequences within a framework characterised by scarcity of human and financial capital as well as limited access to land, capital and markets.

A System Dynamics simulation model, consisting of two modules, describes tradeoffs between labour allocation decisions on the one hand and production and consumption allocation decisions on the other. The model analyses the sensitivity of different types of farming systems to changes in the economic environment based on their resource endowment and preferences. The information to describe smallholder systems was gathered on 119 households in Meegahakivula, a region in the Sri Lankan hill country. A survey, interviews and agronomic field trials were conducted to analyse and model the flows of cash and goods within the household as well as between the households and their environment over time.

The analysis shows that flows of cash and goods are fluctuating over the course of a year around a steady state mainly influenced by the long lasting dry season. Changes in prices of products and production factors, salary-levels or off-farm employment opportunities influence consumption and labour allocation decisions. However, the model shows that strategies which are adapted to the available land and labour resources affecting livelihoods more than mechanisms of economic environment such as changes in prices and wages or economies of scale. To ensure a sustainable increase of income for all types of farming system and hence improve livelihoods in general, a beneficial policy framework and external investments in infrastructure and markets are needed.

Keywords: Consumption, labour allocation decisions, smallholder farming systems, Sri Lanka, system dynamics modelling