A Framework for Analyzing the Role of ICT on Agricultural Commercialization and Household Food Security

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ABSTRACT

Lack of agricultural information has been attributed to the inability of smallholder farmers to transition from subsistence to commercial agriculture. Recent efforts to improve smallholder access to agricultural information have seen increased application of ICT technologies in developing agriculture. These efforts use ICT-based market information to reduce transaction costs of smallholder participation in markets, promote commercialization, and improve household food security. Emerging studies document the benefits of such ICT-based applications in agriculture, including increased incomes and improved performance of agricultural markets. Unfortunately these studies have been context specific and the link between provision of ICT-based market information, smallholder commercialization and household security remains unclear. This paper develops a framework that can be used to analyze the link between ICT application in smallholder agriculture, household commercialization, and food security. The paper generates testable hypotheses relating ICT application in agriculture and reduction in transactions costs, smallholder farmer commercialization, and household food security. It then provides illustrative cases where ICT application in agriculture has benefited smallholder production and improved market performance. However, more research must be done to test the generated hypotheses. The paper discusses the implications of the framework for practitioners.

Keywords: Commercialization, Developing Country Agriculture, Food Security, ICT, Smallholder Farmers, Transaction Costs

1.0 INTRODUCTION

One of the constraints on smallholder farmers’ access to markets is lack, or asymmetry, of information (Barrett, 2008) about product, input and credit markets. Farmers rely on friends, relatives and extension agents for market information. However the usefulness of information from these sources is usually limited because the information is either unreliable or
not timely. The consequences of information asymmetry are problems of moral hazard, and opportunistic behaviour by traders and money lenders towards smallholder farmers. Studies in several African countries indicate that under such circumstances, input and output markets are thin and exchange is personalized, requiring physical presence of parties and commodities (Fafchamps & Hill, 2005; Doward et al., 2005; Fafchamps & Gabre-Madhin, 2006). The high transactions costs of such exchange process impede access to better-paying markets and entrench poverty (Barrett, 2008) because when and if they participate in markets, smallholders are often obliged to accept low prices for their produce (Shiferaw et al., 2007). Furthermore, poor roads and telecommunication networks, increase transactions costs and risks (Poulton et al., 2006) and tends to limit access of smallholder farmers, especially those in remote areas, to efficient and competitive markets.

Lack of market information exacerbates the problem of low-level equilibrium poverty trap that locks smallholder producers into subsistence production and imperfect markets where they typically trade in low volumes. Farmers may thus be unwilling to diversify out of “low value” staples into higher value crops if markets for the latter are too costly or too risky to rely on for food purchases (Fafchamps, 1992; Jayne, 1994).

The problem of farmer access to market information is an old one. Smallholder farmers were not the focus of colonial governments in many developing countries. After independence, many governments still pursued extension methods that focused on larger progressive farmers. While large-farmer bias has to some extent reduced, public agricultural extension systems in most developing countries lack the financial and human capacity to reach the large numbers of geographically dispersed smallholder farmers.

Recent attempts to resolve the problem of poor access to information by smallholder farmers have focused on promoting information transfer through ICT-based innovations (Tollens, 2006; Aker, 2008). Munyua (2007) and de Silva (2008) document the use of several ICT-based interventions in agriculture in Africa and Asia respectively. In Kenya alone, for instance, there were 34 projects that used ICT as a platform for disseminating agricultural information in 2008 (Okello & Jakinda, 2008). South Africa, Kenya, Tanzania, Uganda, Malawi, Madagascar and the whole of West African belt have ICT applications targeting the transfer of information to smallholder farmers.

Evidence of the benefits and impacts of ICT-based interventions in improving smallholder access to markets remains anecdotal. A few studies have attempted to investigate the effects of ICT-based interventions on smallholder and market performance. Examples include use of Internet-based technology to link horticultural farmers to input and output markets in Kenya (Ashraf et al., 2007); use of mobile phones to obtain real-time prices of fish in India (Jensen, 2007), synchronize production practices with export market requirements in Colombo (de Silva, 2008), and by grain traders in Niger to obtain price information in other markets (Aker, 2008). None of the past studies systematically examines the effectiveness of ICT-based market information systems on smallholder market linkage in a broader context that encompasses, among others, the different cultures, commodities, and farmer types. Therefore findings on the impact of interventions are patchy and context-specific.

This paper develops a framework that can be used to analyze the role of ICT interventions in agriculture on household commercialization and food security. It develops a set of hypotheses that can be tested empirically but uses illustrative cases to provide a flavour that there exists evidence, albeit context specific, that the hypothesized relationships might actually exist. These illustrative cases do not in any way mean that the hypothesized relations do exist. Such proof will require more robust studies.

1.1. The Context

The debate on how best to provide smallholder farmers with agricultural (production and mar-
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