

## Chapter 28

# The Role of Mobile Phones Use on Agricultural Output and Household Income in Rural Rwanda

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### ABSTRACT

*This paper assesses the role information and communication technology (ICT) on agricultural output and household welfare of smallholder farmers. The data used in this study comes from a household survey carried out in Nyabihu District, one densely populated area of rural Rwanda. The findings suggest substantial impact of cellular phones technology adoption by farm households. Using the propensity score matching technique, the author finds that agricultural output for mobile phone users is at least 38 percent higher than non-users, whereas their income levels are 26 percent higher on average. The provision of network infrastructure and electricity at community level will enhance agricultural and rural development through increased adoptions of telecommunication technology by smallholder farmers.*

### 1. INTRODUCTION

The rationale of this section is to investigate the impact of Information and Communication Technologies (ICTs) on agricultural output and income levels. Today, ICTs are meant to include equipment that facilitates capturing, processing, display, and transmission of information such as computers (and their accessories), telecommunication equipment (and related services), and audio visual equipment and services. In the context of this study, we consider telephony (the use of cellular phones by farm households) as a proxy of ICTs adoptions due to its outstanding role to facilitate improved access to information and communication on one hand, and to play as prerequisite to advanced technologies use such as internet on the other (Torero & von Braun, 2006).

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Studies have stressed the leading role of ICTs in economic growth and development at both the micro and macro levels. ICT has become a foundation of every sector of every economy around the world because of its multifaceted role in expanding economic opportunities such as reduction of transaction costs and productivity increase, enhancing a flow of information, increasing choice in market place and widening the geographical scope and others (Kramer, Jenkins, & Katz, 2007). Goyal (2013) proved that ICTs can make difference by closing information gaps, and by empowering smallholders and improve market opportunities of farmers. According to von Braun (2010), ICTs may impact the livelihoods of the poor by increasing their access to markets, improving the quality of public goods and services provision, improving human resources quality, and facilitating effective utilization of social networks.

More specifically, cellular telephone technologies are believed to boost economic growth through job creation, increased agricultural and industrial productivity, and diffusion of innovation among farmers. However, much more skeptical views in respect to benefits of ICTs for the poor have emerged. They postulate that access to (or adoption of) ICTs is itself driven by a number of factors such as education, income, and wealth; consequently, the shortage or lack of the above resources may prevent the poor from ICTs adoptions, widening information gap and increasing income disparities within and between countries (Torero & von Braun, 2006; von Braun, 2010).

Recent statistics show that more than 45 percent of Rwandan households use mobile phone technology in their daily activities (NISR, 2012). The Government of Rwanda believes that ICTs can open doors to more economic opportunities for rural poor; efforts have been put in ICT investments over the past decade. The e-Rwanda Project funded by World Bank and implemented by the Rwanda Information Technology Authority intends to empower rural farmers and enable a full access to information about market prices and successful farming. With a network coverage of about 80 percent of the whole territory, even farmers from very remote areas can use their mobile phone devices to check on agricultural commodity prices and can take better price decisions concerning their produce.

However, though much is said about the role that mobile phones can play in agricultural development in Rwanda, no attempt was made to measure the extent at which this technology has impacted the level of output, fertilizer use, and household income among smallholders. This study contributes to the existing literature by measuring the impact of mobile phone use on agricultural output and household income in small scale farmers in Rwanda. In the following subsections, we consecutively present the ICT strategy in Rwanda, the relevant literature, empirical strategy, data description, results, and subsequent interpretations.

## **2. RWANDAN ICT STRATEGIES**

The institutions and mechanisms to create an enabling environment for ICT development in Rwanda were established in 2000. Today, the most prevalent technologies in Rwanda are internet services, mobile applications, outsourcing, information security, clouds computing, and green ICT that aims at creating awareness on increasing environmental regulation. The National ICT strategies are adopted and implemented in four five-year phases under the “National Information Communication Infrastructure (NICI)” designation and coincide with the main policy document “Vision 2020”. The NICI I (or NICI-2005 Plan) was adopted in 2001 and its main focus was to create an enabling environment to the growth of ICT sector in Rwanda through establishment of sound institutional and legal framework. The second

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