Chapter 17
Information and Communication Technology Uses in Agriculture:
Agribusiness Industry Opportunities and Future Challenges

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ABSTRACT

The world has experienced an unprecedented growth in information and communication technologies (ICT) through the widespread use of personal computers, Internet, and mobile phones. The objectives of this chapter are to examine trends in ICT use in agriculture, identify key success factors for ICT utilization in agriculture, and investigate the implications of ICT-enabled value chains for the agribusiness industry. The chapter describes the strategic role of ICT in the development of both e-commerce and mobile commerce in agriculture globally. The chapter identifies the leading areas of ICT use in agriculture and agribusinesses as input procurement, production, marketing, food traceability, and financial service delivery. Producers are increasingly seeking ways to add value to their businesses by integrating ICT in the value chain. Similarly, consumers are becoming more knowledgeable about how they could use ICT to articulate their preferences. The chapter discusses key success factors for ICT applications affecting both the internal and external environment of agribusiness firms. The chapter concludes by drawing implications for ICT use in agriculture and agribusiness value chains.

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1. INTRODUCTION

The world has experienced an unprecedented growth in information and communication technologies (ICT) through the widespread use of personal computers, Internet and mobile phones (Lio and Liu, 2006). Information and Communication Technologies (ICT) refers to the use of available knowledge and skills that allow the use of *facilities* to carry out business activities, chain process, and communication (Vorst van der et al. 2005). Where, facilities refer to any computers, peripherals, systems software, procedures, networks, technical information application packages and communication standards. In agriculture, ICT has found widespread applications in automation of production and marketing management processes including high speed information processing, storage, delivery, and retrieval leading to greater convenience and ease of accessibility. Globally, ICT are serving as cutting edge capital inputs that producers and consumers can find relevant and could provide sustainable solutions to almost all aspects of human endeavor. This paper examines opportunities and future prospects associated with the development of e-business and mobile-based ICT use in agribusiness and agriculture in general. Notably, developing countries and some emerging economies have experienced a major surge in the use of mobile technologies in agriculture and the agribusiness industry (Ayinde etal, 2004; Kantengeza[a] et al, 2011).

Over the past two decades, information technology (IT) systems were narrowly defined and limited to local area network (LAN) and wide area network (WAN) infrastructure where data carrying was considered the main function. But nowadays, IT is used with communication systems and is referred to more broadly as ICT. This modern ICT system integrates voice and data access, enabling instantaneous working environment between different geographically based coworkers, who can not only communicate with each other, but also access and share a wide variety of information. Moreover, this aptitude is not only limited to a fixed place, but can be performed from a wide variety of locations including wireless hot spot, Internet cafes, and even on the move (Lyons, 2005).

Information complexity in regard to business functions and processes is expected to increase as the agribusiness firm operations increase in scale. This information complexity can be the result of increased demand in information acquisition, storage and access regarding all business activities taking into account; customers, suppliers, products, employees, transactions, and internal processes. In this regard, ICT can facilitate information acquisition, processing and exchange in different ways. Some ICT facilitate information management using database and websites, some support supplier functions using websites and e-mails, some improve customer interaction using emails and blogs while others facilitate employee functions using list server, podcasts and intranets. Strategically, the intention and goal of the agribusiness sector will most likely determine the type of technology in use (Burke, 2010).

Given the recent outbreaks in food borne diseases (e.g., mad cow, melamine, etc.) resulting from food safety lapses and contamination, ICT is increasingly being relied upon as a means to provide potential solutions to food tracking and traceability. The increased concern of consumers to health, food safety and environmental issues has increased the stipulation of integrating ICT in food and agriculture quality control systems and related tracking and tracing systems of consumer goods in the supply chain (Vander Vorst et.al, 2002). High transaction costs associated with the transformation of subsistence agriculture to commercial agriculture are a major barrier to farmers. Farmers need to decide what, when and how much to produce and in which markets to sell. In this matter, ICT can play a major role in reducing cost of information search which is part of the transaction cost (Silva & Ratnadiwakara, 2010).

The aim of this chapter is to: 1) to examine trends in ICT use in agriculture, 2) identify key success factors for ICT utilization in agriculture, 3) investigate the implications of ICT-enabled