Chapter 4
Developing a Framework for Next Generation Integrated Agro Food–Advisory Systems in Developing Countries

Alcardo Alex Barakabitze
Sokoine University of Agriculture, Tanzania

Kadeghe Goodluck Fue
Sokoine University of Agriculture, Tanzania

Edvin Jonathan Kitindi
Sokoine University of Agriculture, Tanzania

Camilius Aloyce Sanga
Sokoine University of Agriculture, Tanzania

ABSTRACT

Farming communities in developing countries are adopting ICT based systems for agriculture. However, few countries have formalized national ICT for agriculture framework to guide farmers and other actors in solving problems as per their technological and agricultural needs. This paper proposes a framework for agriculture productivity in developing countries. First the description of the components of ICT based systems to support different phases of farming cycle is presented. Then the proposed framework is explained how it can be incorporated in the farming cycle to improve agriculture productivity. The authors anticipate that the proposed framework can bring an increase in agriculture productivity by improving communication pathways for agricultural knowledge and innovation systems (AKIS). The proposed framework is grounded on establishment of strong link between farmer-extension agent-researcher (agricultural innovation platform) using participatory approaches.

INTRODUCTION

Information and Communication Technologies (ICTs) have been adopted in food and agriculture sector in developing countries over the past years. The adoption of ICTs is due to its importance in improving agriculture productivity and food production (Barakabitze et al., 2015). However, agriculture productivity in developing countries has been hindered by a number of factors including: low land productivity, underdeveloped irrigation potential due to water shortage, inadequate agricultural technical support

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services, limited capital and access to financial services, decline in soil fertility, rapid decrease of fertile agricultural lands due to urbanisation and the effects of climate change (WorldBank, 2011). Poor network of agricultural knowledge and information services and weak linkage in the whole supply agriculture chain (i.e. from farmers to consumers) is another limiting factor to the adoption of ICTs and its practise in the agriculture sector (Hounkonou et al., 2012). Therefore, the slow adoption of ICTs among farming community in developing countries is a challenging issue for a long time (Temu & Msuya, 2004). This is also attributed by inefficiency of the current institutional structures in terms of arrangement and management in the agricultural innovation systems. For example, the conventional existing solutions for agriculture logistics services and farm management information systems are closed proprietary solutions, which make integration and interoperability among different systems to be a challenge (McIntyre et al., 2009). McIntyre et al. (2009) further calls for a need of transparency among actors in the agriculture supply chain (e.g. policy makers, agriculture managers/researchers/scientists and the farming community) in order to increase productivity and sustainability of smallholding farms through establishment of agricultural innovation platforms (McIntyre et al., 2009). Transparency should be enabled along with the Community-based Research Participation (CRP) which has a great potential in developing and promoting agricultural knowledge to farmers (ICARDA, 2015). CRP also is very significant in adopting ICTs in order to meet the total aspirations and socio-economic needs of the farming communities.

The CRP involves participatory involvement of farming communities and other actors in agricultural activities for different phases of the development of ICT based systems for agriculture which can enhance productivity of smallholder farmers (Barakabitze et al., 2015). Various participatory approaches are being implemented in different developing countries. These are Participatory Communication (PC), Participatory Video (PV), Participatory Learning and Action Research (PLAR), Farmer Participatory Research (FPR) and Informal-Mobile Learning Research (IMLR) (Joseph & Andrew, 2008). These approaches have been developed in order to increase the efficiency and effectiveness of the farming community involved in decision making while developing ICT-based agricultural systems. According to Joseph and Andrew (2008), the use of participatory approaches has been witnessed to help mutual learning between farmers and other actors in different agricultural value chains. Participatory approaches can facilitate knowledge generation and enhance the ability of agricultural researchers in interpreting the needs of rural communities.

The use of electronics and computer based system in agriculture and rural domains are also referred to as e-agriculture. According to FAO (2005), e-agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use ICTs in agriculture. This is an emerging field of agriculture and ICT. E-agriculture is one of the action lines identified in the declaration and plan of action for the World Summit on the Information Society (WSIS) (WSIS, 2005). Effective use of ICT for agriculture require national framework for ICT in agriculture. This paper provides an insight on how to develop the framework which can contribute in increasing agricultural productivity in developing countries. Based on lessons learnt from literature review, an ICT-based framework is proposed which involves all actors in the agricultural chain (policy makers, researchers, farmers, Non-Governmental Organization (NGOs), public-private partnerships (PPP) - to mention a few). Further, the framework depicts how it can be linked with the elements of agricultural innovation systems and farmer-back-to-farmer model in the process of transferring the developed ICTs-based systems to farmers.

This paper is organized as follows: section 2 explains the ICT-farming cycle, its main elements and the role of ICTs that can play in the farming cycle (agriculture). Section 3 provides the importance of
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