An eAgriculture-Based Decision Support Framework for Information Dissemination

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ABSTRACT

The ability of farmers to acquire knowledge to make decisions is limited by the information quality and applicability. Inconsistencies in information delivery and standards for the integration of information also limit decision making processes. This research uses a similar approach to the Knowledge Discovery in Databases (KDD) methodology to develop an ICT based framework which can be used to facilitate the acquisition of knowledge for farmers’ decision making processes. This is one of the leading areas of research and development for information technology in an agricultural industry, which is yet to utilize such technologies fully. The Farmer Knowledge and Decision Support Framework (FKDSF) takes information provided to farmers and utilizes processes that deliver this critical information for knowledge acquisition. The framework comprises data capture, analysis, and data processing, which precede the delivery of the integrated information for the farmer. With information collected, captured, and validated from disparate sources, according to defined sets of rules, data mining tools are then used to process and integrate the data into a format that contributes to the knowledge base used by the farmer and the agricultural industry.

Keywords: Data Mining, Decision Making, Farmers, Information Integration, Knowledge Gathering

INTRODUCTION

The livelihoods of the world’s population are still largely dependent on the production of food and other agricultural products (World Bank, 2006; Diao et al., 2007). The vast majority of the population, for example in Sub-Saharan Africa, relies directly on agriculture (Diao et al., 2007). The increase in the global population, that has resulted in a doubling of the world’s population in the 40 years to 1999 and forecasted to increase to 9 billion in the next 30 years (U.S. Census Bureau, 2009), has necessitated improved food production systems. This has been further facilitated by the pressures of climate change, world trade and problems with the global economy which have made it even more important for the agricultural industry to improve the efficiency of food production. Information remains the most effective tool for
the farmer to acquire knowledge, make decisions and communicate knowledge (Kalusopa, 2005). Any improvements in the dissemination of appropriate agricultural information facilitate and enhance farmer knowledge and engender greater capacity to respond to other factors influencing food production.

Considerable efforts have been made by government and university research sectors to find ways to improve rural livelihoods. Studies have investigated the role of information and communication technologies to support agriculture production systems. The term eAgriculture has been coined to describe the enhancement of agriculture and rural development through improved information exchange, communication and learning processes (eAgriculture.org, 2009). eAgriculture has also been defined as “An emerging field, which combines agricultural informatics, agricultural development and entrepreneurship” (Amin et al., 2007). The Food and Agriculture Organization (2000) emphasized the importance of information dissemination to farmers by stating that “information and knowledge play a key role in ensuring food security and sustainable development”. Other studies by Richardson (1997) have suggested the Internet and communication technologies be used to contribute substantially to rural and remote communities, including improving healthcare, education and agricultural productivity.

AGRICULTURAL INFORMATION DISSEMINATION

The dissemination, “to spread or give out something, especially news, information, ideas, etc., to a lot of people” (Cambridge University Press, 2009), or delivery, “the carrying and turning over of letters, goods, etc., to a designated recipient or recipients” (Dictionary.com, LLC, 2009), of agricultural information is integral to facilitating the adoption of new farm technologies. The farmer needs to be aware of the best practices and advances in farm management and breeding. Information on general agronomy practices such as seeding, fertilizer, pest management, harvesting and marketing provides the knowledge base for farmers to make informed decisions. This is supported by Umber (2006) who reported that, for information to be used effectively by growers, it needs to be delivered in a format that can be easily integrated into grower decision making. However, this may only be effective if farmers have the skills to interpret this data and to make decisions relevant to their individual situations (Armstrong et al., 2007).

The timing of disseminating the information is important. Information provided before cropping could include various crop management strategies such as scheduling of seeding activities (Krishna Reddy & Ankaiah, 2005; Tiwari, 2008), improved seedlings (Irivwieri, 2007), input price and availability (Rao, 2004; Tiwari, 2008) and soil fertility (Ekoja, 2004). Other types of useful information may play crucial roles in improving the amount and the quality of products during the growing season. Weather information (Rao, 2004; Tiwari, 2008), fertilizer supply (Ekoja, 2004), fertilizer use in terms of amount and timing (Krishna Reddy & Ankaiah, 2005), pest surveillance and management (Ekoja, 2004; Ratnam, Krishna Reddy, & Reddy, 2005; Rao, 2004; Tiwari, 2008), type and dosage of pesticides (Krishna Reddy & Ankaiah, 2005), weed control (Ekoja, 2004), and disease management (Ratnam, Krishna Reddy, & Reddy, 2005; Rao, 2004; Tiwari, 2008) have all been reported as types of agricultural information disseminated to farmers. Post season information may include marketing advice (International Institute for Communication and Development, 2006), where financial planning and market prices are likely to be required (International Institute for Communication and Development, 2006; Irivwieri, 2007; Tiwari, 2008).

AGRICULTURAL INFORMATION RESOURCES

The information provided to farmers may be derived from a number of providers. Government meteorological organizations may provide information on current and long term weather
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