Use of ICT tools to improve dissemination of rice information in Kenya: a case of the Kenya Rice Knowledge Bank (KRKB)"

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Abstract

Rice in Kenya has become the third most important cereal in the country. Its production however is far below consumption requirements: it is currently estimated that the country produces about 70,000mt while consumption stands at 300,000mt. This low production is projected to improve significantly with improved rice information dissemination on rice farming such as the right seeds and technologies, good crop management, post-harvest and storage. Agricultural research is therefore highly beneficial not only for production of the knowledge and technologies but also when it reaches farmers and stakeholders promptly. However, this has remained a major challenge to date. Although access to agricultural research information by stakeholders within the value chain is gaining pace, the ultimate success to making research knowledge reach the farmer requires innovative systems. The Kenya Rice Knowledge Bank (KRKB) portal is a central hub of online information. It contains data and knowledge about rice farming and management in Kenya. It is built on artificial intelligence technology, open access standards and has capabilities to maintain knowledge and facilitate communication, collaboration, innovation and reuse of knowledge along the rice value chain. The experiences from Kenya Rice Knowledge Bank show that the use of ICT tools for dissemination of rice information is not only instrumental in harnessing the power of scientific knowledge and technology transfer to rice farmers and stakeholders in Kenya but it is also a tool for knowledge democratization amongst the common people. ICT tools such as the KRKB empowers farmers and increases their capacity to make effective and informed decisions.

Keywords: Rice, KRKB, ICT, Open Access, Kenya

1. Introduction

Agricultural research knowledge and technology transfer has traditionally been entrusted to conventional channels with limited opportunities such as farmers' field days, agricultural shows among others. The role of research and advisory services is also clear and that it is to provide highly accurate and specific technical and management knowledge by responding to the needs of the farmers. However, due to challenges facing information dissemination notably poor linkage between research and advisory services there has been low adoption of agricultural technologies. In the case of rice farming in Kenya low rice production has been attributed to poor linkages between research-extension-farmers, and ineffective technology delivery systems, including poor information packaging, inadequate communication systems and poor methodologies. The integration among people and institutions, specifically in the

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research-extension-farmer relationship, has not been successful not only in Kenya but also in other parts of the world.

However, agricultural productivity can be improved by relevant, reliable and actionable information. Therefore, there is a need to understand the functioning of a particular agricultural information system in order to manage and improve it (Demiryurek *et al.*, 2008). According to the findings of Maningas *et al.* (2000), information can only empower farmers through control over the resources and decision making processes, if such information is made available to the farmers. In addition, they also noted that an efficient and effective information delivery channel and technology service facilitates the farmers' critical role in decision making leading to improved agricultural production, processing, management and marketing. Similarly as pointed out by Food and Agriculture Organization (FAO, 2005), for rural development to be realized, access to actionable information is critical particularly in improving the income of the farming community through raising agricultural productivity. Focusing on material inputs alone cannot help achieve sustainable agricultural development, making it necessary to focus also on human resources for increased knowledge and information access using appropriate dissemination tools such as ICT.

In the late 1990s the word "portal" was the buzzword although these have been more popular in the business application particularly Business-to-Business (B2B) and Business-to-Consumer (B2C) environment. The knowledge bank principles to improve access to the required knowledge and keep up with increasing demands for timely information, is made practical in the case of the Kenya Rice Knowledge bank (KRKB). The KRKB is an example of use of ICT tools that enable information to be held within the farmers' hands. It is a dynamic source of rice knowledge and rice production technology: a repository of rice knowledge and a hub of online rice production information in Kenya. It is a comprehensive national repository of research, extension, training and other materials related to rice and rice production. This paper discusses a case study on the use of information and communication technology (ICT) tools (KRKB) to improve dissemination of rice information in Kenya implemented by the Kenya Agricultural Research Institute (KARI).

In the year 2008, the Government through the Ministry of Agriculture, Livestock and Fisheries released its long term-strategy to become self-sufficient in rice by 2030 ("National Rice Development Strategy 2008-2018"). It is also noted that rice consumption has been growing at 12 percent per year, while wheat and maize consumption are growing at 4 percent and 1 percent respectively ("National Rice Development Strategy 2008-2018"). In addition rice is the most favoured grain globally for human consumption, unlike maize and wheat (Ito, 2002).

It has been shown currently rice only contributes less than 1 percent (<1%) to the agriculture sector (FAO (MAFAP), 2013), with a national supply of 60,000MT against the national requirement of 280,000MT (MOA, 2010), making the country to depend on imports to bridge the gap for this staple food.

Therefore, dissemination of research outputs is of great importance: increasing dissemination of rice information has potential in increasing rice production, presenting an opportunity to reduce the number of gravely food insecure people that stands at 816 million by half by 2015 according to the World Food Summit 1996-Millenium Development Goals (MDG). This low production is as a result of a number of challenges and key is low skills/knowledge on rice crop management among extension staff, farmers and processors. The World Bank (1999) report also stressed the importance of training, research and development, and support. Indeed, the Green Revolution succeeded because of collective action among funding agencies, and training institutions.

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In "Knowledge for Development," the World Bank explained that poor countries suffer not only from insufficient financial capital but also from lack of knowledge (World Bank, 1999). It identified two forms of knowledge–related problems affecting many developing countries: Knowledge about technology: that is insufficient knowledge about technology or limited "know–how" results in "knowledge gaps" and secondly Knowledge about attributes: that is knowledge about attributes is essential in building an effective market. The KRKB is therefore a tool developed to address issues related to knowledge access for rice value chain stakeholders.

2. Objectives

1. To create a knowledge and technology repository,
2. To provide a real-time cost-effective information, knowledge and technology access platform
3. To foster linkage among researchers, farmers and collaborators
4. To create a platform to catalyse and strengthen existing institutional capacity through convergence and networking.

3. Methodology

The Kenya Rice Knowledge Bank is organized in a step by step process of knowledge and information from pre-planting to post-harvest management in addition to economics using decision tools, agronomy guides and e-resources to enable farmers make informed decisions for increased production and income. The portal through its knowledge management systems is an efficient warehouse and repository of relevant research information, knowledge and technology in rice farming and business. Rice value chain stakeholders interact with the knowledge bank for different user needs and functions. Farmers, for example, require access to information while researchers, for example, create new knowledge. The knowledge bank is organized into different decision tools such as crop manager, land manager, water manager and post-harvest. The platform provides each value chain stakeholder with an interface for access to information as indicated in the diagram below. The backend contains a database and knowledge manager's portal. The user end provides access to organized information in different forms, queries, workflow, guides and fact sheets.

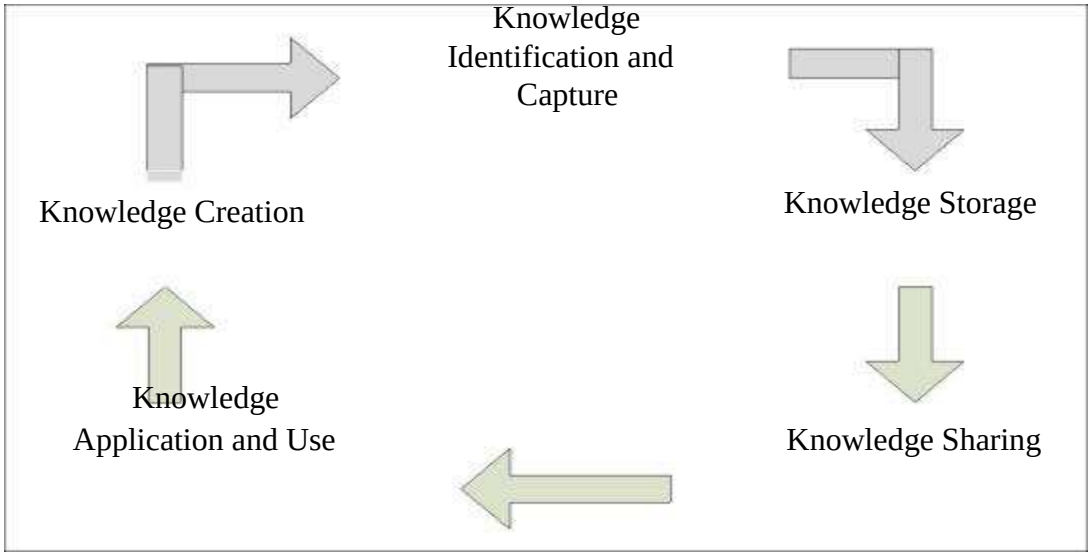

Figure 1. Knowledge management process: Source: Adopted from Cong et al. (2007)

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The Kenya Rice Knowledge Bank is a practical demonstration of Knowledge management processes of capturing, sharing and using of knowledge and techniques. To enable smooth flow of knowledge management to take place both knowledge that is sufficiently better than the existing knowledge, and means for transmitting it must be made available. In addition, the consumers of knowledge must be willing and able to use the "better knowledge" that is available.

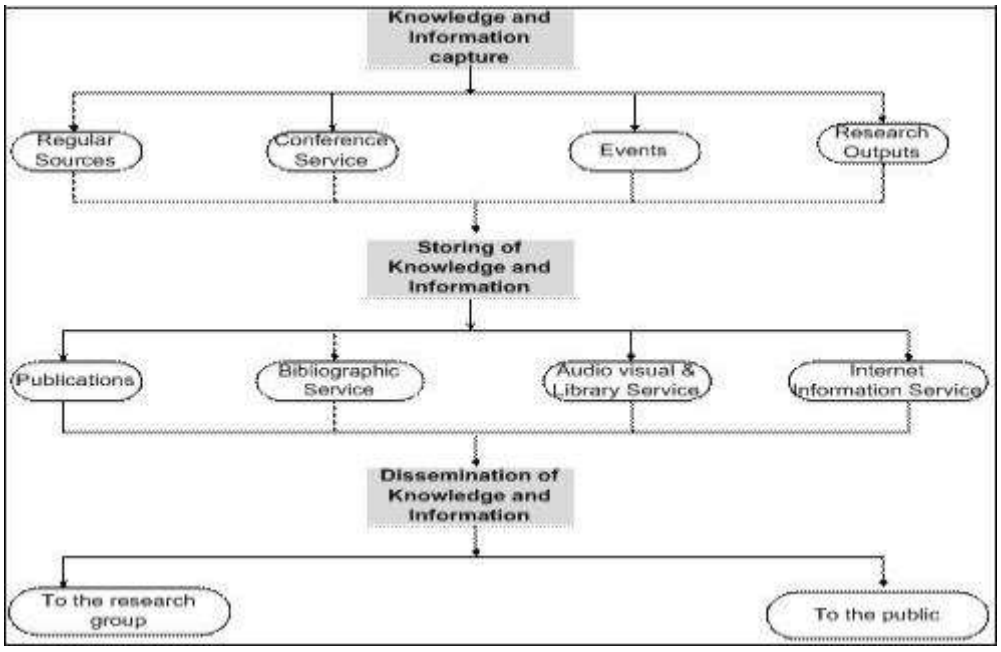
3.1 Knowledge and information tools

Effective knowledge management is achieved when the right knowledge and information is delivered to the right person at the right time in a user friendly and accessible manner that helps the recipients to perform their jobs efficiently (Islam, 2010). The KRKB is developed on a similar principle and objective, as an attempt to application of effective knowledge management.

3.2 Knowledge and information flow tools

Knowledge Creation ⟺ Knowledge and Information storage ⟺ Knowledge and information dissemination ⟺ Knowledge and information use

The KRKB is developed using knowledge and information tools ensuring the knowledge and information flow process artifacts are applied in order to achieve efficient information flow from the source to the consumers.



Source: EIAR: Information, communication and public relations new process operation manual (2007).

Figure 2. Knowledge and Information flow process

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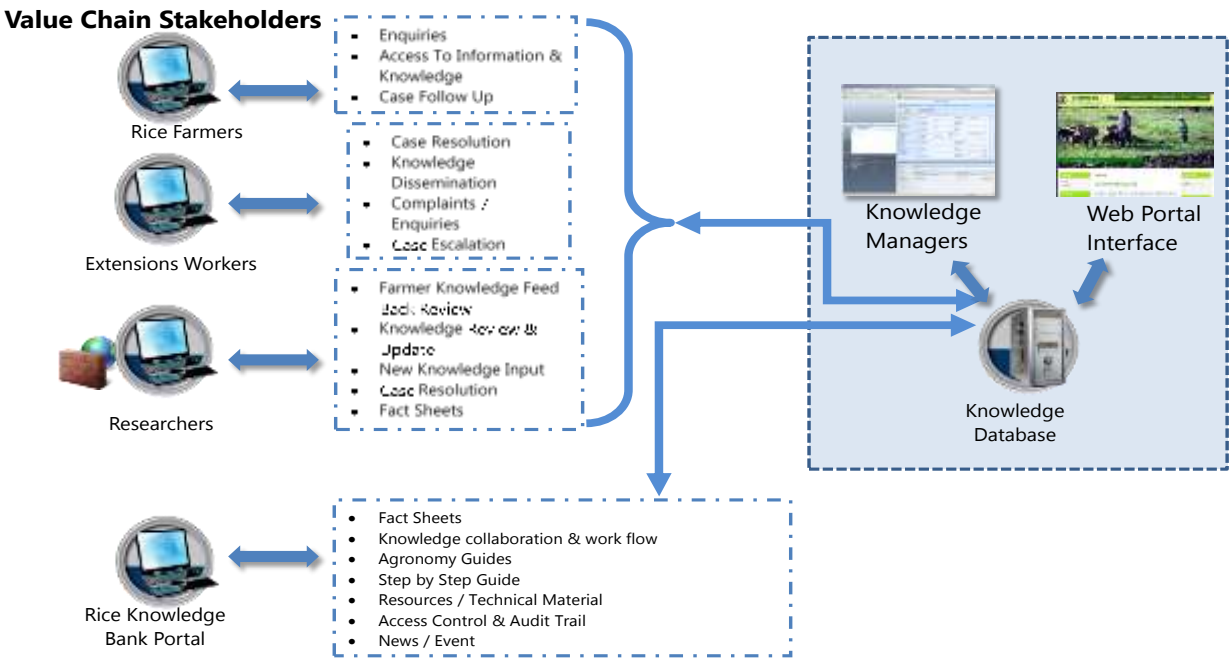

Source: Boniface Akuku, The Kenya Rice Knowledge Bank architecture, 2014

Figure 3: The Kenya Rice Knowledge bank solution architecture

3.3 Open access standards

The KRKB is developed using open database connectivity standards, supported by open access principles at the institution based on general open access principles. These include support for open access to knowledge, facilitation of open access in dissemination of knowledge, such fact-sheets developments, technical resources, raw and meta-data, broader access to information aids and the development of rapid knowledge transfer initiatives. There exist other similar platforms.

3.4 Writeshops

In order to achieve high quality content of the information for posting onto the knowledge bank, a series of write-shops were organized with the specific objective of writing the content and packaging and re-packaging the research knowledge into formats suitable for the farmers' direct use. It was particularly useful for authors' concentration in writing the facts sheets in a short period of time. The selected participants of the write-shop, underwent a pre-workshop discussion, where the process was explained, and expected output determined. The participants were drawn from different disciplines. In addition standard template was designed for uniformity, as well as clear terms of reference for participants were developed.

4. Results and Discussion

The KRKB is a showcase of rice production techniques, agricultural technologies and best farming practices based on the Kenya Agricultural Research Institute's pool of knowledge from research findings, learning, e-resources and from other collaborators. The tool bridged the gap between research and application, adoption and advisory services. This tool provides

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practical solutions for rice stakeholders within the value chain. It supports timely and effective technology transfer of research output to farmers' fields. It aims at sharing rice farming knowledge from national and international research centres and other stakeholders with farmers and extension agents with the ultimate goal of improving livelihoods of the rice farming communities. Agricultural information system is a system, in which agricultural information is generated, transformed, consolidated and receives feedback, and this is what is considered useful knowledge utilization of agricultural information (Roling, 1998).

4.1 Open Access goals and initiatives achieved

By allowing free and immediate access to the results of Kenya Rice's research, the KRKB has been able to enhance information delivery, knowledge sharing, and wider exchange of best practices in research, training, and extension. As a result, open access has benefited national, even regional, stakeholder groups. In addition the KRKB is an opportunity to show case that open access is a good model for making research knowledge not only available to all but interoperable.

4.2 Knowledge Democratization

The new frontier for knowledge dissemination is to address issues related to knowledge and information access. For a long time agricultural research knowledge and the means of its dissemination have been used as tools for exclusion and control, rather than inclusion or farmers' betterment. With the development of the KRKB the national research institution has been able to make its scientific knowledge on rice farming available to all including common people.

4.3 Reduced cost and time for information access

The KRKB provides a single window arrangement for obtaining technological solution in rice farming. The result is effective and efficient resource utilization strategies through partnership and convergence. Real-time access to knowledge using simple and cheap channel technology has positive impact on rice farming practices in Kenya. The net effect is reduced cost and time.

4.4 Enhanced visibility of Kenya rice farming

The KRKB has enhanced visibility of the rice farming techniques, management and other technological solution for international, regional and national value chain stakeholders, including academia. The inclusive and sustainable agriculture research information backed by right ICT technology and innovation has increased the Kenya rice farming global outlook.

5. Conclusion

The Kenya Rice Knowledge Bank provides practical knowledge solutions, specialized for rice farmers in Kenya and other stakeholders. It is a proof that e-agriculture is a good model for addressing the 21st Century challenges in agriculture. To address the biggest challenge to agricultural development, support for fast and effective transfer of technologies from the research laboratory to the farmer's field is inevitable. While other knowledge transfer channels are equally effective, some of them may be hindered by physical boundaries; the

KRKB is fortunately not, due to its innovative nature and use of ICT development and infrastructures.

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