Date : 20/06/2008

Holistic View of Agricultural Information Transfer Systems

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Meeting: **141. Agricultural Libraries DG**

Simultaneous Interpretation: Not available

WORLD LIBRARY AND INFORMATION CONGRESS: 74TH IFLA GENERAL CONFERENCE AND COUNCIL
10-14 August 2008, Québec, Canada

http://www.ifla.org/IV/ifla74/index.htm

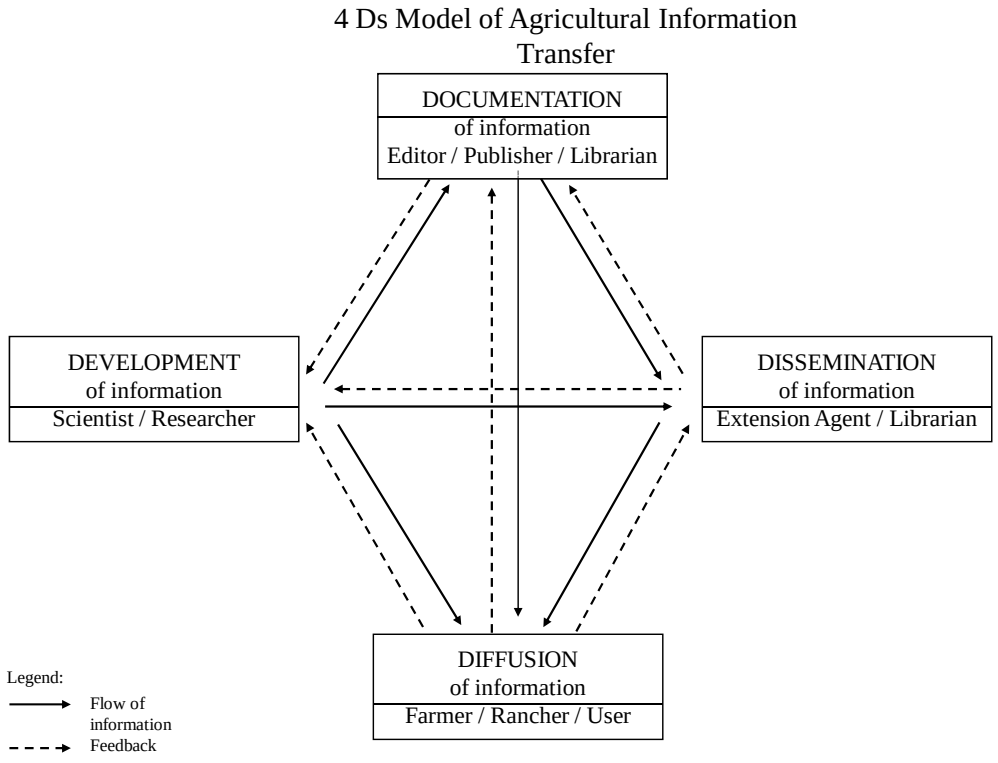
Abstract

Information can best be conceived as a productive resource, potentially limiting and influencing the efficiency of production. Agricultural information transfer system consists of four independent, interrelated components: development, documentation, dissemination, and diffusion of information. They broadly correspond to generation, organization, communication, and utilization of information. Each of these components has several subsystems. Educational and research systems worldwide are the prime movers in advancing agricultural knowledge. They include local, national and international educational and research systems worldwide. Organization and retrieval of agricultural information appears to be solely resting with library and information professionals. Of late, these functions have also expanded to plethora of national and international agricultural information systems. Starting with Extension or farmers' advisory service, the dissemination function is set to land in e-extension service worldwide. The fourth component of the information transfer system, utilization of agricultural information, has to overcome numerous barriers in meeting the information needs of farmers in developed and developed countries. This paper presents a holistic view of all these components with special reference to agricultural research in the light of emerging information technologies and globalization.

Introduction

The decision making process in agriculture rests squarely on information available to farmers, ranchers, entrepreneurs and policy makers. Information can best be considered as a productive resource, potentially limiting and influencing the efficiency of production. Traditional communication systems reflect a one-way flow of information and the feedback is subtle. Information retrieval systems recognize the need for a two-way flow, with feedback, while in scientific information transfer there are multiple participants, with cross-communication among them. Achleitner (1995) defined information transfer as creation, dissemination, organization, diffusion, and use of information. In package oriented library or information publishing systems, delivery of an information package is the goal, whereas the information transfer system is concerned not only with the delivery of ideas but also the impact of these ideas on users (Landau et al, 1982). Agricultural information system consists of four independent, interrelated components: development, documentation, dissemination, and diffusion of information, which broadly correspond to generation, organization, communication, and utilization of information. The participants in the Four Ds model facilitate interaction, networking, feedback and collaboration by serving each other in a dynamic dual function as both a resource base and customer base as depicted in Figure 1.

Figure 1



Development of Information

Development corresponds to advancement of knowledge and generation of information. Despite spectacular advances in science and technology and apparent economic prosperity, over one billion people worldwide are desperately poor. More than 800 million people do not have enough food or access to other primary commodities to meet their basic needs. The World Bank estimates that 75% of the very poor live and work in rural areas and depend on agriculture for their livelihood, either directly or indirectly. More than one billion people still live on less than US$1 a day. Conversely, less than 4% of the population in the industrial countries and less than 2% in the United States are directly engaged in agriculture (Borlaug, 2001). While industrial countries face the problem of over production, developing countries face the challenge of increasing food production and ensuring food security. Since 90% of the food consumed in many developing countries is produced locally, increased production could improve the health and well being of the poor. Food security is the foundation for social security.

A variety of institutions such as colleges, universities, experimental stations, national and international research institutes facilitate generation of information. The scientist as a part of his/her job sees, reads, writes, talks, and listens, which correspond broadly to observation, experimentation, analysis, interpretation, literature review, discussion and communication of results. Formal and informal channels of communication are extensively used to interact with fellow scientists, editors, publishers, librarians, change agents, and end users. Conventional and non-conventional sources of information including electronic sources are generally used at every stage of research. Also, the scientists are authors as well as end users.

Over the past several decades, three models for organizing professional resources to solve agricultural and rural development problems have emerged. The first is the counterpart model, in which an individual scientist or expert is employed by a technical assistance agency to function in an advisory role. The second is the university contract model, in which a university in a developing country and a university in a developed country establish a special relationship. The third is the international institute model, in which international institutes are established with a global agenda focused on a specific commodity. The latter model evolved from the historical success of imperial institutes focusing on commodities such as tea, rubber, sisal and sugarcane (Ruttan, 1989).

Beginning in the 1940s, several initiatives were set in motion by the establishment of international assistance agencies in developed countries. They include FAO, UNDP, World Bank, Ford Foundation, Inter American Development Bank, Canada's International Development Research Center (IDRC), International Fertilizer Development Center, and the USAID-funded Collaborative Research Support Program (CRSP). The 1980s and 1990s saw the creation of the Australian Center for International Agricultural Research (ACIAR), the Japan International Research Center for Agricultural Sciences (JIRCAS), the European Agricultural Forum, and the Global Forum on Agricultural Research (GFAR), which also collaborated in these global research programs. Of all the U.S foundations, nongovernmental, and private voluntary organizations, the Rockefeller and Ford

Foundations played leading roles in promoting and funding the initial international agricultural research centers (IARCs). In 1960 the International Rice Research Institute (IRRI) was established in the Philippines, followed by 15 other IARCs. With the establishment of the IARCs, the need for a coordinating body for funding and oversight became apparent. The CGIAR was established in 1971 as an informal consortium of government, international and regional organizations and private foundations.

Changing Trends in Agricultural Research

Publicly funded agricultural research is going through a serious crisis almost everywhere, not only because of declining budgets but also because scientific projects have been carried out in a rigid, mechanical, and linear fashion with limited opportunities for interaction with farmers and private enterprises. The private sector has become more prominent in the fields of biotechnology and information technology, which are influencing agriculture. The modalities for providing extension services to resource-poor farmers are also changing. Non-governmental organizations (NGOs) are striving to relate the real problems of farmers to the academic perspective of scientists. NGOs also supply extension and education services to resource-poor farmers (Henriquez and Franca, 2004).In both developed and developing countries, the forces of globalization, market liberalization, technological progress, and evolving ideas on the role of the public and the private sectors are exerting immense pressure for change. Janssen and Braunschweig (2003) described the principal innovations observed in financing and organizing agricultural research in five developed countries--USA, Australia, Switzerland, the Netherlands, and the United Kingdom; they also reviewed the policy environment to see how this has contributed to the reorganization of research.

Organization of Information

Documentation corresponds to organization of information. The editor/publisher helps the scientist with manuscript preparation, advises on publication ethics, and peer review, as well as interacting with the producers, distributors, and consumers of science information in identifying and correcting deficiencies in current publication processes. The editor may act as the author's mentor (Shashok, 2001). Librarians acquire, organize, and provide bibliographic and full text information to the scientist. They are the resource bases for all the users in the system. Over the years several national and international agricultural information systems have been developed. They include AGRIS of FAO (Food and Agricultural Organization of the United Nations) and Agricola of National Agricultural Library. In addition, several crop, animal or mission oriented subsystems have emerged. FAO and NAL pioneered in providing open access to their databases in agriculture which laid strong foundation to open access movement for full text access.

Dissemination of Information

Dissemination corresponds to communication of information. Teacher, preacher, journalist, extension agent and librarian are partners in communication of information. There appears to be every need to distinguish technology transfer from information transfer. It is said that technology transfer is show-how of knowhow of do how. The reference librarian/extension agent acts as information intermediary and disseminates the required information to the user

in anticipation as well as on demand. The information is repackaged in such a way as to be understandable by the end user. The process is interactive and provides for multidirectional flow of information. For example, e-extension is an interactive learning environment delivering the best, most researched knowledge from the smartest land-grant university minds across America. E-extension connects knowledge consumers with knowledge providers - experts who know their subject matter inside out. E-extension is not like any other search engine or information-based website. It is a space where university content providers can gather and produce new educational and information resources on wide-ranging topics. (http://about.extension.org/).

Utilization of Information

Rogers (1962) carried out pioneering work on the diffusion of innovations. Diffusion corresponds to utilization and assimilation of information. Utilization aims at putting knowledge to work. It also means evolving strategies for overcoming barriers to utilization of information, understanding information needs, and designing information delivery systems. The end user interacts with the scientist, the librarian and the extension agent by providing feedback. While a lot still needs to be explored, and experimented, the trend to explore the use of latest participatory web-based tools, for example Web 2.0 tools such as blogs, wikis, tags, and other social net working tools to improve collaboration and share experiences for the benefit of agricultural development.

Conclusion

Agriculture is a location-specific activity to produce food, fiber and feed. However, agricultural research is increasingly a global undertaking and the continued productivity of farmlands rests to a large extent on joint efforts to uphold and improve yields. Agricultural research depends on inputs from a broad range of disciplines. Isolated researchers are finding it increasingly difficult to confront the numerous challenges in increasing food production alone. For instance, agricultural technologies are sensitive to local climate, soil and other attributes. Unlike many medical, mechanical or veterinary innovations that are applicable from one place to another, local adaptation is required for crop technologies. (Reddy, 2005). Electronic access to sources has resulted in productive use of precious time at every stage of research. Some of the significant impacts for scientists include: timely sharing of data and intermediate results for collaboration and discussion by eliciting instant feedback from colleagues and fellow scientists; global participation and narrowing the digital divide; instant interaction with publishers, editors, change agents and potential users; wider scope for publication and dissemination of findings; enhanced visibility of authors.

The integration of scientific agricultural centers through connection to the Internet has facilitated direct links between scientists and thereby effective collaboration.
The exponential growth of electronic sources of information has also has greater impact on extension agents and librarians. Although networked electronic sources are accessible to end users, for a variety of reasons such as affordability, availability and acceptability, it is expected that greater use will be made of change agents and libraries. The Internet has altered the expectations of library users and changed the service perspectives of librarians

and other information providers (Lankes, Collins, and Kasowitz, 2000). Increased expectations from the heterogeneous group of patrons involved demand different strategies for searching diverse databases, and this will have the positive impact of increased demand for technical skills to make use of technology. Library and information professionals will not necessarily be needed for one-on-one consultation or guidance in choosing the databases. For example, the functionally literate farmer is able to interact directly with the scientist. In other cases the information has to be repackaged by the change agent/extension worker to be transferred either directly or thru other channels. More sources will lead to more options for sources, resulting in higher patron expectations, and need for more reliance on new technologies (Tenopir and Ennis, 1998).

The advent of the Internet, reinforced with a variety of web-based information services, has meant that the boundaries between the author, publisher, librarian and user are shrinking. At the same time, the gap between the haves and have-nots is widening. Access to digital sources and, more particularly, collaborative efforts in building up digital sources of scientific information, are therefore a most welcome sign in closing the gap, using the help and expertise of all.

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