IST-Africa 2008 Conference Proceedings
Paul Cunningham and Miriam Cunningham (Eds)
IIMC International Information Management Corporation, 2008
ISBN: 978-1-905824-07-6

An ICT-Based Digital Content Information Access Framework in Developing Countries: the Case of Agricultural Informatics Access and Management in Uganda

Raphael Aregu[1], Dr. Martin Bagaya[2], Prof. John Nerbonne[3]
[1]*Faculty of Computing and Information Technology, Makerere University, P.O. Box 7062, Kampala, Uganda.*
[Also University Librarian, Gulu University, P.O. Box 166, Gulu, Uganda].
Tel: +256 782 682 088, Fax: + 256 471 32094/5 Email: r.aregu@rug.nl, ul@gu-library.info
[2]*Faculty of Computing and Information Technology, Makerere University, P.O. Box 7062, Kampala, Uganda.; Tel: +256 753 392413*
[3]*The University of Groningen, Fac. der Letteren, Groningen, Post Bus 716 NL 9700 AS, The Netherlands.;*
Tel: +31 50 363 58 15, Fax: +31 50 363 68 55 Email: j.nerbonne@rug.nl

Abstract: The study is tailored towards investigating the level and extent of ICT based access to digital content and information by the Ugandan agricultural and development community. The target community includes the researchers, policy makers and selected groups of farmers who have attained the level of recognising their information needs. This very particular paper is focusing on the current ICT based digital content access systems and methods among Ugandan agricultural research and development sector. Attempts are made, using business modelling methods and other information sciences methodologies, such as bibliometrics, to evaluate the current access models, content usability etc. Preliminary findings indicate skewed development strategies and action interventions in the country.

Keywords: Digital Content; Information; Internet; agricultural research; development; poverty; Uganda; Agricultural informatics; Agriculture; Rural development.

1. Introduction

The purpose of this paper is to present the preliminary findings of our study, especially the digital content and information access among researchers in Uganda. We believe that information has increasingly become an integral part of human development and accesses to it can no longer be considered a luxury. For instance, it is in this background that Millennium development goals have access to ICT as one of the core strategies for reducing poverty among the least developed countries *[1]*. The rapid advances in the growth and development of Information and Communication technologies may not be useful after all if they do not promote the creation, collection, processing, storage and dissemination of people-oriented content. This study, as one of its objectives, attempts to influence the formulation of democratic [people-ICT-Information access oriented] strategies at all levels of development.

Agricultural informatics is a new concept that has arisen following the rapid development in information and communication technologies, and of the Internet. Recently, referred to as e-agriculture, agricultural informatics is an emerging field in the intersection of agricultural informatics, agricultural development and entrepreneurship, referring to agricultural services, technology dissemination, and information delivered or enhanced through the Internet and related technologies, [2]. e-Agriculture, however, goes beyond technology, and ensures to promote the integration of technology with multimedia, knowledge and culture, with the aim of improving communication and learning process between various actors in agriculture locally, regionally and worldwide.

The opportunities offered by the ICT s should be captured through a process that takes into account the contributions and the local needs of all parts of global society. ICTs for instance, allows the capture, processing, transmission, storage, retrieval and display of text, images, video, graphics, animations etc, *[3]*, implying that almost all information needs of the agricultural and development process could be improved. Generally, we note that digital content or information is taken to mean many things. A few writers, such as *[4]*, have given detailed justifications why access to digital content spurs economic development. In our paper, we attempt to review the paradigms of information and mainly access theories so as to inform our thesis and delineate the scope of context relevant to the study. For instance we borrow theoretical discussions of *[5]* to enrich our methodologies.

As one of the landlocked country in East Africa, Uganda's economy is predominantly agrarian; consisting of 6,810,000 ha (or 16,282,000 acres) of land under agricultural activities and cultivation. The sector provides employment source to 85% of the population; contributing between 32-38% of export earnings, and in addition generating 44% of the GDP. Almost 90% of food security comes from agricultural production, [6]. However, subsistence cultivation is still the pattern, whereby 70% of the area under cultivation is used to produce locally consumed food crops.

We wish to report that our study is still ongoing and therefore more interesting findings are anticipated.. This is a PhD research project supervised by Dr. Martin Bagaya of Makerere University, Kampala, Uganda and Prof. John Nerbone of the University Groningen, The Netherlands. Initial guidance had also been obtained from Dr. Alex Klugkist, University Librarian, University of Groningen, The Netherlands.

1.1 The problem

The problem we are addressing in our study is focused on the level of access to a specific category of content and information among Ugandan agricultural and development stakeholders. Indeed there is evidence that information is available in both print and digital formats, the level of Internet connectivity is gradually increasing as well, though at a snail speed. However, access to both digital and print content is still a problem. The problem under scrutiny can be summarised in three distinct statements:

- the lack of (or insufficient) framework that would stimulate accessibility to both local and internationally published content.
- Difficulties in collecting, transmitting and storing content/information generated locally and on global networks, and
- the drawback of access models to content and information available on global networks, as typified by the IP; and password and user-name models.

Due to the above, there is a significant level of research duplication, a weak policy framework and lack of digital local content on the national and global networks, and the increasingly weakened extension services. The level of awareness among policy makers is still low. The current access models are publisher modelled and therefore tend to maximise benefits to content publishers contrary to mass impact on the agricultural community. In this paper, we are giving a preliminary picture of the problem in Uganda, and we note that

this replicates itself even across other least developed countries.

The use of computers in managing agricultural informatics is not new in Uganda. The National Agricultural research Systems for decades used computers and other ICT equipments and devices ease data handling and utilisation.

2. Objectives

The main purpose of the study is to, (using business models approaches), recommend an ICT driven framework for creating, transmitting, storing and preserving digital content and information among Ugandan agricultural and development stakeholders and institutions. The study, in addition, hopes to come up with Content Localisation Framework to enable the localisation of content accessed from global networks.

The specific objectives are:

1. To determine the extent of local content access to agricultural research and development stakeholders in Uganda,
2. To assess the efficacy of agricultural information access systems available to the Ugandan community,
3. To review the content creation mandates and policies among Ugandan agricultural research systems,
4. To establish the level of access and utilisation of digital content and information among policy makers and farmer communities, and
5. To influence policy on the economic development potential of access to digital information.

3. Methodology

The study is using both quantitative and qualitative methods. The case study design is applied where empirical data is being collected using questionnaires, interviews, documents analysis, and group discussions with farmer groups. The case study and the empirical approach are suitable for this study and have been used before by many Information Science researchers, for instance *[7]*. This is because a case study as an empirical enquiry method allows us to:

- investigate a contemporary phenomenon within its real life context. We are able to collect empirical data from the different parts of the sample and make tentative conclusions to our propositions, especially among the farmers and policy makers.
- the boundary between phenomenon and context are not clearly evident, this is the case with our study. There is no clear boundary between the researchers, policy makers and the farmer groups. This is because the successful completion of any agricultural research and development project depends on all of the three groups, (researchers, policy makers and the farmers groups).
- multiple sources of evidence can be used. We are able to collect data from several other sources such as databases being accessed, libraries and repositories, farmer gardens and selling chains, etc.

The study design involves the use of questionnaires, analysis of Internet and print documents, and group discussions among selected farmer groups. However, due to resource limitations, a little sample of farmers (10), researchers (10), and policy makers (6), were selected at random. A questionnaire was self distributed among them and collected at their convenience. The limitation found was the number of qualified respondents, especially among farmers since most farming systems are subsistence and rarely seek for information.

4. Technology Description

In this section we attempt to describe ICTs with a focus to their role and importance in

promoting agricultural research and development in Uganda. The challenges encountered by the users are identified, such as:

- requirement of Internet Protocol identification; user name and password as access points to relevant digital information,
- limitations of enabling infrastructure, connectivity challenges and costs
- infrastructural policy and legislation framework, government commitment and support; and
- digitisation benchmarks and standards cognisant with local needs.

For decades, different technologies have been adopted as a means of improving agricultural output at the global level. The latest technological adoption includes that of Information Technology led agricultural development. In his institutional report, for instance, [8], discusses the IT integration strategies in Indian Agricultural development.

5. Developments

As pointed earlier our study is still on-going and these are results represent possibly 40% of our work so far. The initial stages involved setting the research process and focusing on policy makers including policy and the legislative framework. In this paper, we describe the contribution of our study and we propose models that could promote the access and the use of digital content among Ugandan agricultural research and development stakeholders by empirically analysing the current agricultural information systems available to the study population.

6. Results

Phase one of the study focused on digital content access trends as a means of setting out the scene of our study. It also involved getting data from policy makers, especially among agricultural research institutions. Our findings show that the current access methods employed locally and by the global networks in the developing countries are not good enough since their impact on the grass root population is still very low. We find that policy makers fall within four main categories, those at the ministries' level, at the research institution level, at the district level and at the village level. At each level, the kind of content required is different and also the type and level of technology. We hope to discus these scenarios in detail in our completed study.

Secondly, agricultural Information is accessed from both local and international networks and institutions. Locally, there are three main institutions engaged in agricultural informatics generation and dissemination. These are the National Agricultural Research Organisation, (NARO), a public a agency charged with all issues of agricultural research and development. NARO in support of others partners, such as the Food and Agricultural Organisation, (FAO), have put in place a service codenamed the Agricultural Research and Extension Network (ARENET) available on-line at http://www.arenet.or.ug. ARENET is expected to be an agricultural information portal whose main goal is improving, through strengthened research-extension linkages, the agricultural advisory services provided to resource poor farmers in support of food security, rural development and poverty eradication.

The second public agency charged with agricultural development in Uganda is the National Agricultural Advisory Services, (NAADS), whose mission is to increase farmer access to information, knowledge and technology for profitable agriculture production. The long term plan of the NAADS is to become a decentralised farmer owned and private sector serviced extension system contributing to the realization of the agricultural sector development objectives. It is hosted at http://www.naads.or.ug.

The third, agency, (which is regional), involved in agricultural research and

development is the Association for Strengthening Agricultural Research in East and Central Africa, ASARECA head-quartered in Entebbe, Uganda. ASARECA's main mission is to promote economic growth, fighting poverty, reducing hunger and enhancing resources through regional collective action in agricultural research for development, extension and agricultural training and education, (ASARECA, 2008: http://www.asareca.org).

In addition, there are a number of other public and private institutions engaged in agricultural informatics generation in Uganda. For instance, respondents reported accessing agricultural information from university library websites, non-government organisation websites, and United Nations agencies websites among others.

With the use of questionnaires, preliminary results show that barely about 10% of the farmer communities are aware of ARENET, while a further 5% actually find it useful.
A majority of ARENET users are researchers, (75%), while policy makers rely heavily on printed reports and publications. The results also show that the usage of Internet among farmers is still low (25%), while the figure is quite high among researchers, (68%). Again policy makers do use Internet through the sub-ordinate staff, especially secretaries, and mainly for accessing emails.

Again, preliminary investigations indicate very few users utilising the NAADS services. Of the sample population studied (10 farmers; 10 researchers and 6 policy makers), only combined 20% do actively access the NAADS site, while the rest depend on NAADS staff visitation, documents, and announcements.

A bigger number of the respondents reported not being aware of ASARECA, 84%. The majority of those using ASARECA are mainly researchers.

On global resources, a few respondents (a combined 35%), report knowledge of AGORA, TEAL, CTA, FARA, CGIAR and AGRIS of FAO, among others.
Generally, a smaller portion of respondents report accessing agricultural informatics through websites, (49%). A number of factors are being advanced for this scenario, among which are:

- Little knowledge on the existence of the said websites
- Lack of Internet connection, hence, heavily reliance on cafes
- Poor and un-even connectivity in the country
- Heavy reliance on subsistence systems
- Lack of infrastructural base
- Inadequate policy strategy frameworks and legislation
- Political will and commitment. etc

7. Business Benefits

Through this study, we hope to promote the utilisation of digital content among developing countries there by contributing to national efforts of poverty alleviation and the fight against hunger. The digital divide is reported to even increase further if deliberate efforts are not taken to improve access among those without access. This implies access to enabling infrastructure and content, *[9]*. The study benefits not only the Ugandan community but also those involved in software development, content publishers, researchers in digital content, policy makers all over the world, the UN Millennium Development Goals (MDGs), etc. We expect to provide a basis for a harmonised agricultural informatics framework in Uganda.

8. Conclusions

The concept of access to digital content and information is huge and this study is only attempting to make a contribution. We are only presenting part of our findings as the study is meant to last for the next two more years. Comments from the research and practising

community will enrich our work. The preliminary findings indicate a need for research in this area given its infancy. Research will guide policy, technological design and anticipated changes, among others. Our study is still continuing and more data is being collected. This paper presents preliminary findings and methods as a means of pilot testing the research methods and instruments.

References

[1] Earnshaw, Rae and Vince, John (eds). Digital content creation. 2001. ISBN: 978-1-85233-379-9.

[2] FAO. e-Agriculture: a definition and profile of its application. http://www.fao.org/rdd/doc/e-agriculture%2014-10-051.pdf. Accessed: 27th January 2008.

[3] World Bank. World Bank group, ICTs and MDGs: a World Bank group perspective, Global ICT development, Genava, 2003.

[4] Dolfsma, Wilfred. Some economics of digital content. Erasmus Research Institute of Management, Report research series in management, Rotterdam School of Management, 2004.

[5] Wolfram, Dietmar and Xie, Hong. Traditional IR for web users: a context for general audience digital libraries. Information processing and management, (38), 2002. p. 627-648.

[6] World Development Report 2008: Agriculture for Development

[7] Yin, Robert K. Case study research: design and methods. Beverly Hills, CA: Sage. 1984.

[8] Sarma, M.V.S. Agricultural informatics & communication: perspective and prospective. http://dacnet.nic.in/dacnet-workshop-pre-f.ppt. Accessed: 25th January, 2008.

[9] McCreadie, Maureen and Rice, Ronald E. Trends in analysing access to information. part 1: cross-disciplinary conceptualisation of access. Information processing and management, (35), 1999, p. 45-76.