

## Trends of ICT usage in Agriculture and Extension

Ranjan Roy\*<sup>1</sup>

Ranjan Roy (2009). Trends of ICT usage in Agriculture and Extension (Review paper). Bangladesh Res. Pub. J. 2(1): 307-318. Retrieve form <http://www.bdresearchpublications.com/admin/journal/upload/08048/08048.pdf>

### Abstract

In an information oriented society the information-poor have become the resource-poor. Information leads to opportunities that generate resources. This paper attempts to explore the status of Information and Communication Technologies (ICT) in Bangladesh and the relationship between ICT and Agriculture as well as Extension. In the era of globalization, the role of extension would have to change from transferring technological innovations from research to farmers. It is a paradox connectivity constrains are developing in Bangladesh ever before. The existing information and communication environment poses new opportunities for agriculture sector. The findings revealed that the usage of ICTs in Bangladesh agriculture in an initial stage, a number of ICT project has been in existence recently. It is too early to evaluate whether it has been successful or not in a setting as enormous and complex as Bangladesh. We can simply point out that its growth for last five years is impressive.

**Key Words:** Information; Communication; Technology; Agriculture and Extension.

### INTRODUCTION

The world today is an "Information Society". There is an ever-increasing use of information in all aspects of human activity. This also means that there are many technologies that assist in providing information in a timely manner. Historically, food security and economic development depend on access to information and learning through knowledge management and exchange. While information has always been indispensable in processes of political, economic and social development, the way in which information is accessed and controlled is widely debated (Hafkin and Obame, 2002) In recent years, there are much discussion about the "digital divide" in which some members of society or areas of the world are left behind others who have access to new ICTs. The poor, illiterate, displaced or disabled person, racial and ethnic minorities any of these social groups could be left behind by the ICT.

---

\* Lecturer, Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka-1207

ICT is a collective term given to the new generation (second and third) information technologies spawned by the merger of computers and telecommunications (Flor, 2001). ICT may be web-enabled, networked or stand-alone; it may take available an information or knowledge system; or it may generate an information or knowledge product or service. One feature of ICT is the convergence of media (print, audio, video, multimedia etc.) made possible by a common digital platform. In 2000 Okinawa Summit of G7/G8 nations describe ICT as “one of the most potent forces in shaping the 21<sup>st</sup> Century....fast growing a vital engine of growth for the world economy” (Flor, 2001). Understanding the place of ICTs in developing country agriculture depends on four key concepts: that knowledge is an increasingly significant factor of production; that all actors in the agricultural sector are part of an evolving Agricultural Knowledge System (AKS); that ICTs accelerate agricultural development by facilitating knowledge management for AKS members; and that ICTs are essential for coordinating mechanisms in global trade (USAID, 2003).

USAID peer organizations such as the World Bank, FAO, Foundations and other bilateral are taking similar approaches for ICT opportunities-connectivity provision, capacity building for users, agricultural content development and aggregation as well as conducive policy advocacy. The vast majorities of ICT applications in agriculture are still in pilot stages and are distinguished more by the agricultural development themes they address than by the donor funding them. Therefore, the following objectives are formulated in order to give proper direction to the review work-

1. To describe the present status of ICT in Bangladesh
2. To explore the relationship between ICT and Agriculture as well as Extension in developing world

### **Global Picture of ICT**

From Mexico and Brazil in Latin America to the governorates in Egypt and the villages of India, a wide range of organizations are promoting and supporting the creation of local entities that would make ICTs available on an affordable basis to everyone. While, they have a variety of names and configurations, we refer particularly to the multi-purpose community telecenters. where people share access to a variety of ICT and related services. Vigorous actors in championing and supporting these enterprises are United Nations agencies such as WHO, FAO, UNDP and UNESCO, InfoDev, DFID, Gates foundation, GKP, bi-lateral donors such

as USAID and IDRC, and national governments from Hungary and Malaysia to South Africa. In Latin America many non-governmental organizations are active in ICT initiatives (Colle and Yonggong, 2002). India alone generated export revenues of \$31.4 billion (5.2% of GDP) and employed 1.6 million people in the sector in 2006 - 2007. ICT sector can also contribute to social development. It reduces gender inequality as the sector is gender-biased in employment. Women hold 70% of BPO jobs in Ghana because no gender specific skills are required; and women are intrinsically better suited for communication, multitasking, and collaborative team work (Kuek, 2008).

**Table 1:** Overall status of ICT use in agricultural research and development in Asia counties

Group	Countries
A- advanced users of ICT in ARD	Australia, Japan, South Korea, Taiwan
B-Less advanced users of ICT in ARD	India, China, Malaysia, Pakistan, Philippines, Thailand
C-Rapidly developing ICT use in ARD	<b>Bangladesh</b> , Fiji, Indonesia, Iran, Nepal, Papua New Guinea, Sri Lanka, Vietnam
D-Slow development in ICT use in ARD	Afghanistan, Cambodia, Laos, Myanmar

*Special note:* In group B, C and D except Malaysia, there is no report of a functional library network (Maru, 2003).

**The seven most appropriate ICT project themes for improving rural livelihoods in the world**

Several ICTs related projects are taking place in most African countries and are initiated by international development agencies such as IRDC, World Bank, ITU (Zongo, 2001).

1. Improving Universal Access telecommunication policies and programs, Trinidad & Tobago.
2. Rural credit and rural financial services, Uganda.
3. "Louder" rural and agricultural stakeholder voices, Uganda.
4. More informed rural people and farmers, Solomon Island.
5. Improvements in efficiency and effectiveness of rural service delivery, Egypt.
6. Improved ICT planning capacities among civil society organizations, Africa.
7. Application of ICTs in land surveys and registration systems, Philippines.

(Richardson, 2006)

## ICT in Bangladesh

The Information and Communication Technology (ICT) Sector in Bangladesh is a rapidly growing and changing industry. ICT plays an indispensable role in promoting openness, accessibility, accountability, connectivity, democracy and decentralization- all the "soft" qualities so essential for effective social, economic, and political development. Considering the gravity and importance of ICT Bangladesh Govt. has declared ICT as a "Thrust Sector" and a project "Support to ICT Task Force" primarily for introducing e-governance is being implemented. The ICT sector has grown approximately 22% in the past two years, and is expected to grow by over 48% in the next two. The mobile phone sector alone has witnessed 180% growth from January 2005 to February 2006 (BCS, 2006). A large work force with different levels and various expertise of ICT is growing in Bangladesh. The potential for growth is extraordinary, particularly in the export market. Current figures approximate Bangladesh's ICT market size to be US \$170 million annually; computer networks and hardware constitute the largest proportion, followed by software and internet and network services (Bangladeshinfo, 2004).

### ICT Profile- Bangladesh

Total population	: 138.23 million <sup>1</sup>
Rural population as a percentage of total population	: 76% (estimated)
Key economic sectors	: Ready-made garments, frozen foods and shrimp, tea, raw jute and jute products, leather and leather products, chemical fertilizer, handicrafts, ceramic products,
Literacy in the national language(s)	: 56%
Computer ownership per 100 inhabitants	: 0.78 <sup>2</sup>
Telephone lines per 100 inhabitants	: 4.64 <sup>3</sup>
Internet hosts per 10,000 inhabitants	: 0.015 (estimated)
Internet users per 10,000 inhabitants	: 19.04
Internet cafés/telecenters per 10,000 Inhabitants	: 0.19 (estimated)
Cell phone subscribers per 100 inhabitants	: 3.91 <sup>3</sup>
Number of websites in English and other language(s)	: 600 (estimated) <sup>4</sup>
National bandwidth within the country	: 68 Mbps (data) (estimated)
National bandwidth to and from the country	: 112 Mbps (estimated)

(Source: UNDP)

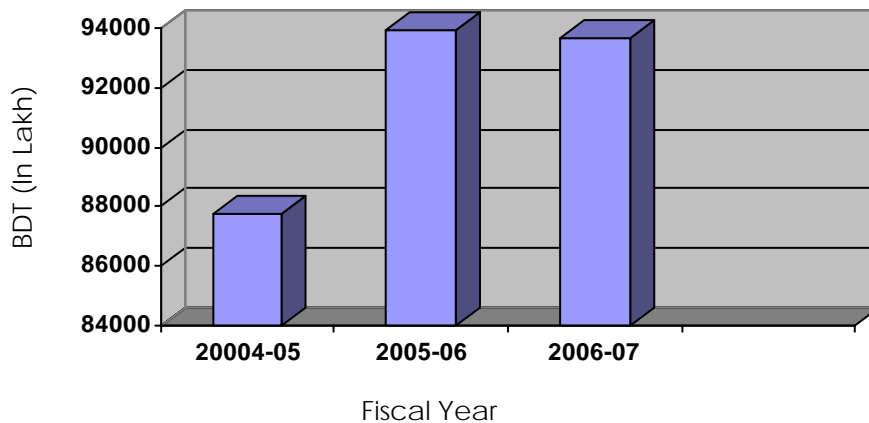
1. Total Population: 138,226,485. Source: Bangladesh Bureau of Statistics;

2. ITU Estimate, 2003;

3. Number of Telephone: Fixed -1,007,450, Cell - 5,413,800, Total - 6,421,250 (as on 9 May 2005). Source: Bangladesh Telecommunication Regulatory Commission;

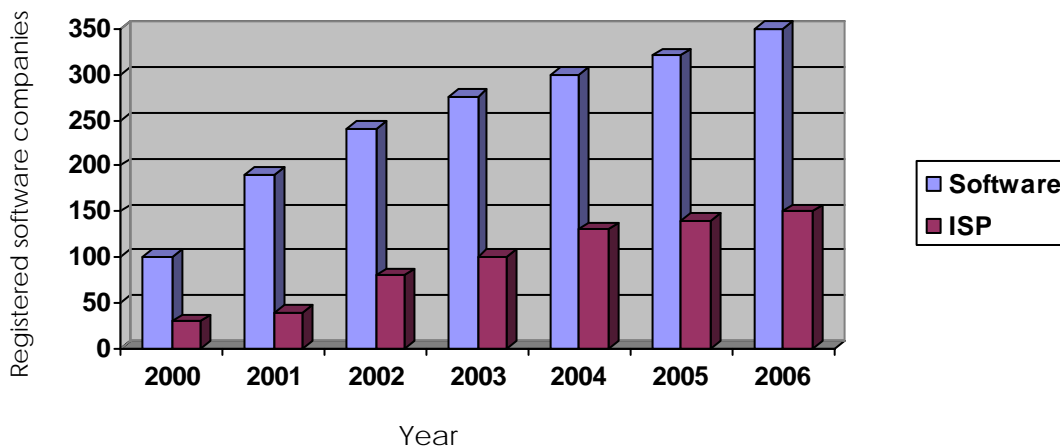
4. The number of website registered with dot bd authority as on 30 April 2005. In Bangladesh, dot bd is not popular. Businesses and government agencies tend to use dot com and dot org domains.

### Total Budget in ICT sector in Bangladesh (Alam and Ahmed, 2008)



### Growth in ICT Companies in Bangladesh

There are currently over 300 registered software companies in Bangladesh employing approximately 4,000 technical professionals. Recently, the market has been experiencing significant growth. BCS research shows an average of 23% growth in the industry in the past two years, with the greatest strides being made in the hardware industry, which shows 25% growth in the past two years; software and ISP businesses comprised 16%, 15% and of that growth, respectively (BCS, 2006).



### Agriculture and ICT

Information and communication technologies (ICTs) continue to expand the reach of development, particularly by bringing new sources of information and new tools for local knowledge dissemination into rural areas. This issue of The Drum Beat focuses on ICT innovation in agriculture and rural development, providing a selection of summaries of projects, strategic thinking articles and resources, and evaluations from across the globe. The global wave of information

and communication technology (ICT) revolution has not left Bangladesh untouched. With increasing zeal, government and non-government organizations have taken steps over the last few years to create relevant digital content for the poor. ICTs enhancements to agriculture programs-the four "C"-(i) **Connectivity** & access (ii) **Capacity building** (iii) **Content** & application development (iv) **Conducive** governance & policy. SAARC Agriculture Centre (SAC) proposes that ICT needs to be conceptualized in its many facets, perceptions, and in its manifold impact in farming societies. SAARC Agriculture Centre (SAC) has been striving to foster such research partnerships among institutions and other stakeholders in the SAARC region (Sohoo, 2008)

**ICT has the potential to improve agriculture in three main areas** (Kuhlmann, 2008)

#### **Information gathering and processing:**

The tedious counting, measuring and weighing done manually or by analog devices has been substituted to a large extent by electronic sensors and digital data collection systems, such that the data may be fed directly into digital decision support models without additional data handling.

#### **Information sharing and disposal**

Telecommunication and data warehousing are the preconditions for distributed data processing, involving many agents, logging into the systems at different locations and at different times. An efficient overall management of complete supply chains becomes feasible, as well as data and information exchange for E-Commerce.

#### **Tracking of resources and products**

Using this technology, farmers are able to enter information about their products into a central database while they are working, which saves them the hassle of having to upload the information separately.

ICT is great and good but without a proper intermesh with environment, and physical aspects of agriculture and rural economic development, as well as other physical infrastructure bottlenecks like good road and rail connections, even water ways, it will remain a non starter.

#### **Successful ICT Project in Bangladesh**

Pallitathya Help-Line Project of D.net is a successful ICT initiative in Agriculture. The 'help-line' project is a model in which villagers will call a mobile

phone number (or a set of numbers) to make a specific query or to disseminate some urgent information. The call will be answered by an operator at a 'help-desk' located at D.Net's headquarter building in Dhaka, who will respond as appropriate. The pilot phase proposed in this document will cover 'help-line' services in four villages of Nilpahamari, Bagerhat, Jhenaidah and Magura districts. The villages are chosen on the basis of their remoteness from cities.

### **Successful ICT Project (Radio Farm Forum and Afronet) in Zambia:**

Radio Farm Forum is a government-initiated ICT project to enable rural farmers to communicate effectively with the Ministry of Agriculture. This form of ICT implementation has proven to be extremely successful in addressing the common needs and problems of resource-deficient rural farmers. Afronet, an international human rights network, uses ICT to effectively disseminate information across the world. This case proved particularly useful in reducing Afronet's costs, and improving its efficiency (Bobbili and Luczynska, 2007).

### **Global trends in Extension: Potential Roles for ICTs**

Extension workers occupy a strategic position in agricultural development cycle. They are responsible for simplifying research information and delivering it to farmers in an effective and easy way to understand and providing feedback mechanism to researchers on problems faced by farmers (Tellefson, 2002). Amidst the changes facing extension there is a growing recognition that farmers and members of rural communities need for information and appropriate learning methods that are not being met (Greenridge, 2003). Over the past 20 years, the dominant donor-supported extension approaches has been public sector provision for the training and visit system (T&V). Evaluation research demonstrates that T&V has not proven itself to be a system that fully meets the demands of user for appropriate content and learning methods (World Bank, 1999). Extension workers have long used all sorts of traditional information and communication technologies such as radio, television, print, drama and video. Today, farmers' clients and other intermediaries are also exploring newer, digital opportunities that can be used to exchange, process, manage and communicate information and knowledge. In the context of changing paradigms in agricultural extension, where linear information flows are being replaced by pluralistic information flows and new actors are emerging to form community information spaces- farmers will become more and more able to access any information they need on their own. This development is enhanced by ICTs. ICTs offer tremendous capabilities to the

agricultural sector in terms of information storage, fast and inexpensive communication channels, links between different media, easy and enjoyable use at comparatively low and steadily declining cost (Kiplang'at, 1999). Kiplang'at (2002) reports on experiences in Kenya, South Africa, Srilanka and elsewhere, nothing that there are some important innovations, but there is still a long way to go before a meaning full impact on extension services is seen. He notes that the trend is to mitigate conventional delivery systems such as radio and television, with new ICTs using approaches that run counter to the linear and governments-owned flow of information that dominated the T&V approach.

### **ICTs in Developing Country Agriculture**

The developments of ICTs and the Internet in particular have revolutionized the entire Agriculture field, generating new market, changing the structure of the Agriculture distribution channels and re-engineering all processes around the world. There are a number of successful ongoing ICT projects in agriculture sector-

- **e-Choupal**, implemented in India
- **Village Phone Programme of Grameen Bank**, successfully implemented in Bangladesh and replicated in Uganda and Rwanda
- **GPCIC**, implemented in Bangladesh
- **Pallytathya** implemented in Bangladesh

All these projects have used trained individuals or telecentres/kiosks or both to provide the rural farmers with the access to the use of ICTs. E-Choupal deals with the computer and internet connectivity. VPP renders telephone services through mobile phones. GPCIC uses both mobile phones and computers for telephone and internet connectivity. The importance of using telecentres or trained personnel to provide the rural communities with ICT access is echoed in the development informatics literatures. ICTs are expensive for the rural poor people. Language and literacy are also major barriers. In the VPP project of Grameen Bank and Grameen Telecom, the rural women own mobile telephones by getting microfinance facilities. GPCICs are initiated by the rural young entrepreneurs. Pallytathya offers help and information to support livelihood of the rural people. However, these three projects do not directly target the rural farmers. E-Choupal is a project developed particularly for the farmer. The set up and operational cost of e-Choupal is quite high. The penetration of mobile phone is also faster and higher in Bangladesh comparing to internet connectivity. The mechanisms and objectives of these projects are combined to design a suitable

model for the rural Bangladeshi farmers in this proposed project. Some other projects like B2Bprice.com in the Philippines and KACE in Kenya (both of the projects use ICTs to access market price for the agricultural produce) also provide understanding for developing the proposed project (Dey, 2006).

### **The Feasibility of ICT in Rural Areas**

Some development planners have been skeptical of the cost and benefits of ICT-enhanced strategies over traditional modes of agricultural development assistance since the beginning of the digital revolution. Equipment costs, the technical infrastructure requirements to support PCs, and electrical scarcity in rural areas may at first make ICT investments seem uneconomical. On closer examination, one can easily overestimate the costs and underestimate the aggregate benefits that ICTs can bring, particularly if one starts from the assumption that ICT interventions are limited to desktop computers connected the Internet.

### **Financial Aspects**

Investments in ICT look quite inexpensive compared to the cost of large infrastructure investments such as hydroelectric dams and road systems. However, they can seem quite costly compared to the average income of a poor family. On balance, well-planned ICT-enhanced interventions tend to boost the impact and longevity of development assistance, while simultaneously assisting with monitoring and knowledge gathering in project activities.

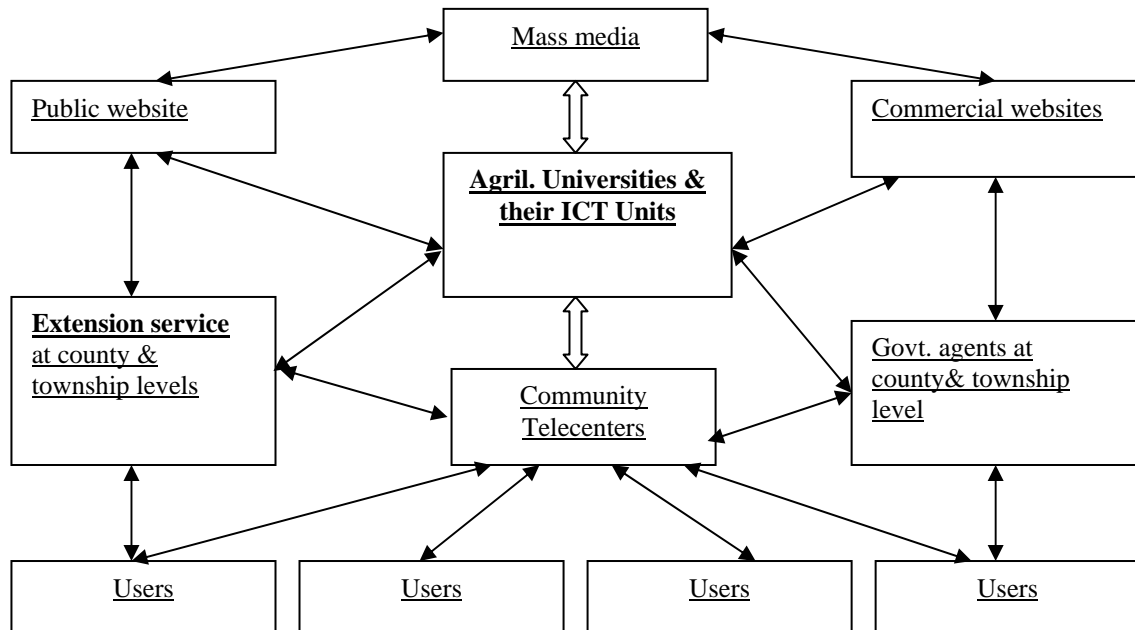
### **Technical Aspects of ICT Feasibility**

Some of the most important hardware considerations in ICT and ICT-enhanced projects were covered in the preceding section, which emphasized the importance of moving beyond a computers-laptops-Internet model when using ICT to integrate information systems for agriculture. When working with international agricultural researchers, national government agencies, universities, and other more "elite" organizations, desktop/laptop-cum-Internet and Internet portal approaches make sense, but more remote, less affluent, and less literate areas may demand alternative hardware systems that suit local needs and capacities.

### **Agricultural universities and the development of local content**

Universities are a basic information and education institution in nations all over the world. They are generators of knowledge (through research, analysis, information, integration and discussion); they store knowledge in their libraries;

and they pass on knowledge and information through formal instruction, forums, non-formal education, publications and other media. China has developed systematic higher agricultural education institutions across the country, with at least one major agricultural university in each province.



(Colle and Yonggong, 2002)

### Regional Overviews of Agricultural Extension Services

**Africa:** ICT are yet to have meaningful impact on the provision of extension services in Sub-Saharan Africa. In Kenya, for example mostly radio, television and video are being used as ICTs but they stated different pilot projects.

**Caribbean:** Face-to-face meeting and radio have been the dominant means of communication and that use of ICTs for agricultural information has yet to be adopted on a large scale.

**Pacific:** Both government and commercial extension services still rely on print and radio to communicate and the adoption of ICTs will demand changes in agricultural extension systems.

**India:** In India extension services run by radio, television, mobile, demonstration and presentation. Mr. Ajit Maru (2003) showed that hardware and network-centered approaches as well as ICTs for rural communication would not be useful and unsustainable without the generation of local content and indigenous capacity to generate that content. Moreover, India developed a substantial number of public and private sector ICT agricultural extension project like

Agmarketnet, E-Chaupal, Agirwatch, India Agriline, Tata Kisan Kendra and so on. Besides these, India as well as China is reshuffling the ICT sector, conducting ICT related research and making ICT professionals in full swing.

## CONCLUSION

In this study it is observed that ICT in agriculture in an initial stage a long way we have to go. There is no single solution or best ICT project to fit in this sector; a variety of approaches would be needed, particularly in the early stage of ICT expansion in rural areas. It is also found Govt. as well as Private Companies and so on is positive to develop ICT sector in agriculture. Besides these, agricultural extension in transition. Our extension personnel need to equip with ICT tools to provide effective and efficient extension services. The Government should take initiative to increase access to and use of ICTs in the effort in agricultural development. It is essential to effectively bring ICT on the development agenda and country development strategies, where appropriate.

## REFERENCES

- Alam, M and K. Ahmed, (2008). E-Governance Initiatives in Bangladesh. ICEGOV2008-GUC-Cairo, 12 February.
- Anon. 2000. Okinawa Charter on the Global Information Society, G8 Scholarly Publications and Papers, University of Toronto G8 Information Centre.
- Anon. (2005). Bangladesh Telecommunication Regulatory Commission, Dhaka, Bangladesh.
- Bangladeshinfo.com. Bangladesh: The next IT outsourcing destination? Retrieve from <http://www.bangladeshinfo.com/it/focus04.php>
- BCS. Industry Profile and Statistics, Bangladesh, (2006). Retrieve from <http://www.asocio.org/resources/profiles/Bangladesh-Profile.pdf>
- Bobbili, R. and M. Luczynska, (2007). Radio Farm Forum and Afronet: Learning from Successful ICT Projects in Zambia, Media, Education, and the Marketplace Case Study Final Project.
- Colle, R. D. and L. Yonggong, (2002). ICT Capacity-building for Development and Poverty Alleviation Enhancing the Role of Agricultural Universities in China. A paper presented for third Asian Conference for Information Technology in Agriculture, Beijing, October 26-28.
- Dey, B.L. (2006). Connecting Bangladeshi farming communities with mobile telephony technologies: a proposed model. Queen's University Belfast, UK.
- Flor, A. G. (2001). ICT and Poverty: Indisputable Link. Paper for Third Asian Development Forum on "Regional Economic Cooperation in Asia and the Pacific" organized by Asian Development Bank, Bangkok, June 11-14.

- Greenridge, C. (2003). ICTs Transforming Agricultural Extension? Presentation to CTAs 6th Consultative Expert Meeting of CTAs Observatory on ICTs, Wageningen, the Netherlands.
- Hafkin, N.J. and Obame, H.H. (2002). Gender, ICTs and Agriculture. A Situation Analysis for the 5th Consultative Expert Meeting of CTA's ICT Observatory meeting on Gender and Agriculture in the Information Society. The Hague, Netherlands. 11-13 September.
- Kiplang'at, J. (1999). An analysis of the opportunities for information technology in improving access, transfer and use of agricultural information in the rural areas of Kenya. *Library Management*. 20(1-2) 115-127.
- Kiplang'at, J. (2002). Use of wireless technology and others forms of ICTs in bridging the digital-divide in the communication of agricultural information in Sub-Saharan Africa. In proceedings of the second biennial DISSA net conferences on Progress in Library and Information Services in South Africa Edited by Theo Bathma and Andrew Kaniki, Pretoria, October 24-25.
- Kuhlmann, F. (2008). IT Applications in Agriculture: Some Developments and Perspectives. National University of Singapore.
- Kuek, C. (2008). Leveraging ICT for Bangladesh's Growth and Competitiveness. A Project: Korean Trust Fund for ICT4D.
- Maru, A. (2003). ICT Status-Asia Pacific. A paper presented for CTA Observatory, ICT and Agricultural Extension, Wageningen, the Netherlands.
- Pigato, M.A. (2001). Information and communication technologies, poverty and development in Sub-Saharan Africa and South Africa.
- Richardson, D. (2006). ICTs- Transforming Agricultural Extension? Report of the 6<sup>th</sup> Consultative Expert Meeting of CTAs Observatory on ICTs, Wageningen, the Netherlands.
- Sohoo, S. (2008). ICT Initiatives of SAARC Agriculture Centre in the SAARC Region, International Conference on Computer Science and Information Technology, August.
- Tellefson, L.C. (2002). Requirements for improve interactive communication between researchers, managers, extension agents and farmers. [on-line] available: <http://www.agr.gc.ca/pfra/sidcpub/sidpub3.htm>.
- USAID, (2003). Future Directions in Agriculture and Information Communication and Technologies (ICTs). Winrock International, Version 4.0-14. P.-1.
- World Bank, (1999). E-Sri Lanka: Transforming lives through Technology, Devnews Media centre, September, 22.
- UNDP, ICT Profile – Bangladesh. Retrieve from <http://www.apdip.net/projects/dig-rev/info/bd/> and <http://www.unescap.org/rural/ictegm2003/index.htm>
- Zongo, G. (2001). Information and Communication Technologies for development in Africa: trends and overview. IDRC: ACACIA.