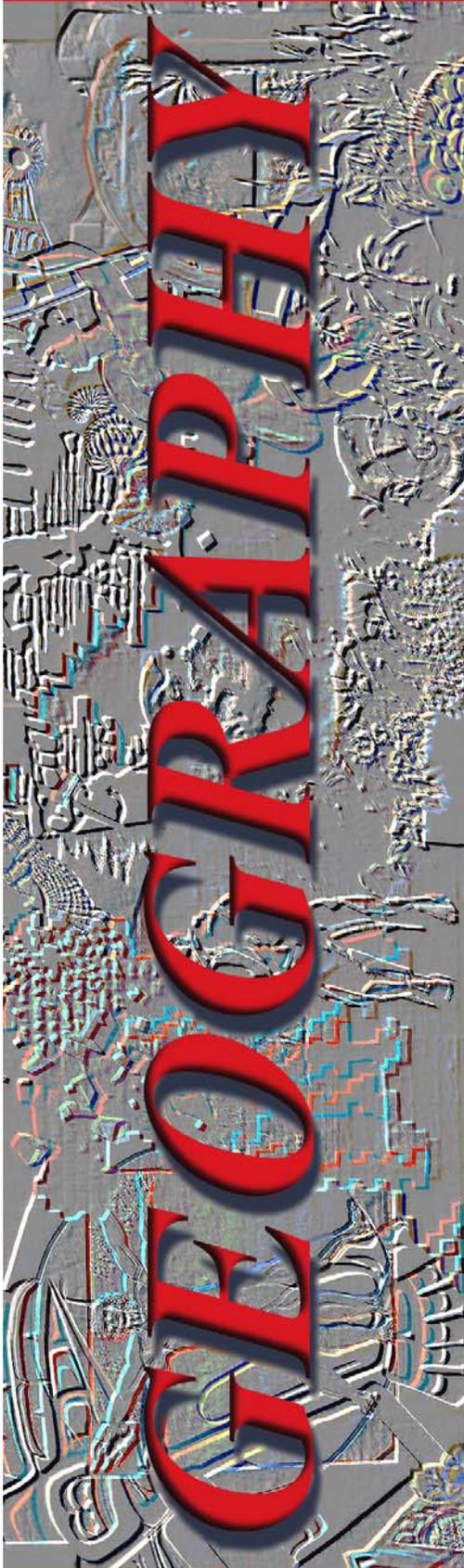


# Tackling Isolation in Rural Mongolia:

## Use of Information Communication Technologies in Agricultural Extension Services

Oyuntuya Shagdarsuren



The University of Reading

Geographical Paper No.181

# **Tackling Isolation in Rural Mongolia:**

## **Use of Information Communication Technologies in Agricultural Extension Services**

Oyuntuya Shagdarsuren

**Geographical Paper No.181**

**February 2007**

The author is an MSc graduate from the International and Rural Development  
Department, University of Reading

**Series Editor: A. M. Mannion**

Email: [a.m.mannion@reading.ac.uk](mailto:a.m.mannion@reading.ac.uk)

## ABSTRACT

Mongolia is an isolated country with a large territory and a small population. Geographic and social isolation affect rural communities both politically and economically. Isolation results in “information hunger” in rural Mongolia and contributes to increasing poverty following the country’s transition to a market economy in 1990. This paper explores the opportunity of using information and communication technologies (ICTs) to address isolation and the lack of information in rural Mongolia. International experiences show that the benefits of ICTs are best achieved through the use of an intermediary in the context of rural areas in developing countries. As agriculture is the backbone of the rural economy in Mongolia, the paper suggests that agricultural extension services can serve as an intermediary by using ICTs to make information available for the wider rural community. The methodology of the research is based on a literature review; qualitative and quantitative evidences are drawn from published and unpublished literature, government reports and policy papers as well as internet research. The research was funded by Rotary Ambassadorial Scholarship and University of Reading, UK within an MSc program.

Findings show that demand for information in rural Mongolia is extremely high, but largely unmet. Current teledensity rates and access to the internet are low and likely to remain so in the near future. Attempts to provide direct access to internet for the rural population have not been sustainable due to low income levels. As a solution, this paper suggests investing in ICTs through agricultural extension services. This can contribute to reducing rural poverty through providing information, increasing agricultural production and improving coordination between different stakeholders in agriculture and rural development. Thus, agricultural extension services in Mongolia can improve the use of their human resources by adopting a broader role to become “rural information and communication intermediaries”. Extension workers need training on communication methods and the use of media for development purposes. It is shown that providing access to ICTs through agricultural extension services in rural Mongolia can reduce isolation and create sustainable information and communication networks.

**Keywords:** ICTs, development, Mongolia, agriculture, extension services, information and communication technologies.

## INTRODUCTION

*“The desire to overcome physical and psychological isolation appears to be a major factor driving internet usage.”*

*ITU (1999)*

### Isolation in Mongolia

The name “Mongolia” is often associated with something far and distant. Indeed, this country, located in Central Asia (nowhere near Europe!), is isolated from most of the world even today. Sandwiched between two powerful states of Russia and China, Mongolia is the 18<sup>th</sup> largest country in the world. It occupies a landlocked territory of 1.5 million square kilometres and lies within geographical parameters of 41° 35" - 52° 06" of latitude and 87° 47"- 119°57" of longitude; despite its large territory, Mongolia has a small population of 2.5 million people (NSOM, 2004)



*Herders' autumn camp*

The aim of this research is to investigate the isolation caused by geographical location and low population density, as a challenge to economic growth, human development and environmental sustainability in Mongolia, especially for rural areas. In an attempt to offer a solution, the opportunities offered by information and communication technologies (ICTs) and their application through agricultural extension services are examined.

ICTs in this paper include traditional television and radio and modern digital technologies such as mobile telephony, computers and the internet as well as their various applications. Internet and mobile telephony have spread quickly around the world since 1995 (ITU, 1999). According to the International Telecommunications Union (*ibid.*), the internet is valuable for overcoming isolation in developing countries which are often economically isolated and suffering from a shortage of information. In this context the internet is considered as a way of "leapfrogging" into the development mainstream through improved commerce, improved delivery of health and education services and reduced effects of distance from markets, poor basic infrastructure and under-utilised capacity. The limiting factors in the use of ICTs, including the internet, are shortage of infrastructure and high costs of connection which reflect the scarcity of resources in developing countries (ITU, 1999). Kenny (2002) argued that the cost of providing internet access is not justifiable compared with costs of using radio and telephony in addressing poverty in developing countries.

Despite these challenges, the Mongolian Government is committed to benefiting from ICTs. As part of its Millennium Development Goals (MDGs), Mongolia has set a target of building an "information society" by introducing ICTs in all sectors of socio-economic development. The adoption of new technologies in Mongolia has been rapid compared with traditional technologies. The country's report (GOM, 2004a) on the status of implementation of MDGs claims that the use of cellular telephony has grown by 193.1 percent from 1999-2004. Currently, Mongolia has 8 internet service providers and more than 10 out of 21 provincial centres have connections to high speed internet. The advantages of high literacy rates and a young population in Mongolia promise quick penetration of ICTs, but this paper shows that the provision of ICTs for rural areas needs to be reviewed carefully.

Donor organizations such as the United Nations Development Programme (UNDP), non-governmental organizations such as the Mongolian Society for Open Society (Bayasgalan, n.d.; Johnson *et al*, 2005) and the government of Mongolia (GOM, 2004a) have made several attempts to provide internet directly to rural population by establishing information and internet service points in provincial centres. This approach has not been

successful due to the low incomes of the rural communities. A more viable solution seems to be through intermediaries.

The role of the intermediaries would be to “translate” new external information suitable for local conditions and vice versa. For example, the intermediary organizations should consider local preferences for images, colour and sound when designing new information or educational programmes. Furthermore, the intermediaries can serve as “bridges” between the rural poor and the outside world by making the grassroots “voices” heard at national or even international levels. Intermediaries can also create local online content for recording and reporting important local data, information, news and events for access and use by wider public. Intermediate organizations therefore provide significant potential for encouraging the use of ICTs for rural development (Melkote and Steeves, 2001).

This paper suggests that agricultural extension services may become such an intermediary in rural Mongolia.

Agricultural extension services aim to alleviate poverty and increase agricultural production through information, advice, training and technology transfer. Agricultural extension centres have increased in number since 1996 and are now present in all provinces of Mongolia. While emphasis is on agriculture, the need to broaden the scope of activities towards “rural extension” is already felt (MFA, 2005). The terms “agricultural extension” and “extension” will be used interchangeably in this paper; however, the two terms will imply slightly different meanings. The former will refer to the current extension service with agricultural focus and the latter will mean the new type of extension services incorporating broader issues of adult education, health and environment.



*A goat herder*

The existing agricultural extension network appears to be the largest operational system in Mongolia to deliver information and training to rural citizens. This paper proposes that

ICTs should be introduced to rural areas through agricultural extension services. The research is based on a literature review. Qualitative and quantitative evidences have been drawn from literature, published and unpublished reports, policy papers as well as internet research.

### **Isolation and “Information Hunger” in Mongolia: The Context**

*Isolation sustains poverty: services do not reach those who are remote; illiterates cannot read information of economic value, and find it difficult to obtain loans. Isolation goes with physical weakness: remote households may have a high level of migration of the able-bodied to towns or to other rural areas. Isolation also accentuates vulnerability – remote marginal areas are more liable to crop failures, and are less well provided with services to handle contingencies like famine or sickness; illiterates also find it harder to register or acquire land and are more easily cheated of it. And isolation means lack of contact with political leaders or with legal advice, and not knowing what the powerful are doing.*

Chambers (1983:113)

The objective in this section is to analyze how geographical and social isolation creates “information hunger” in rural Mongolia and how political and economic isolation have accentuated it under market economy conditions.

Mongolia’s vast land is divided into 21 administrative units called Aimags. Aimags are subdivided into 336 Soums which consist of 1674 Bag, the smallest administrative units. Distances from the capital Ulaanbaatar to Aimag centres are great, ranging from 43 km to 1636 km. Population densities are among the sparsest in the world. Population density varies considerably, as shown in *Figure 1*, the average being 1.58 persons per square kilometre.



*The road between Ulaanbaatar and Darkhan*

Rural accessibility in Mongolia is not yet universal. Today there are only 1900 kilometres of paved roads (NSOM, 2004) mainly located in urban areas. Rural transport remains a major problem: out of 172,412 herding households only 20 percent own cars, 33 percent own motorcycles and 3 percent own tractors (*ibid.*) The use of road transport is also constrained by seasonal variations: winter temperatures are freezing and so roads turn slippery and dangerous.

Mongolia's isolation with vast distances and low population density requires alternative solutions such as telecommunications. Development of this sector is necessary for counteracting isolation, as has occurred in developed countries such as Canada and Australia which also have low population densities, as shown in *Table 1*.

**Table 1: Information technology and population in Mongolia, Canada and Australia**

<b>Indicators, 2004</b>	<b>Mongolia</b>	<b>Canada</b>	<b>Australia</b>
<b>Information Technology</b>			
Fixed line and mobile phone subscribers (per 1,000 people)	<b>184</b>	<b>1053</b>	<b>1359</b>
Households with television (%)	<b>29</b>	<b>99</b>	<b>96</b>
Internet users (per 1,000 people)	<b>80</b>	<b>626</b>	<b>646</b>
Mobile phone subscribers (per 1,000 people)	<b>129</b>	<b>469</b>	<b>818</b>
<b>Population</b>			
Age dependency ratio (dependents to working-age population)	<b>1</b>	<b>0</b>	<b>0</b>
Fertility rate, total (births per woman)	<b>2</b>	<b>2</b>	<b>2</b>
Life expectancy at birth, total (years)	<b>65</b>	<b>80</b>	<b>80</b>
Mortality rate, infant (per 1,000 live births)	<b>41</b>	<b>5</b>	<b>5</b>
Population density (people per sq. km)	<b>2</b>	<b>4</b>	<b>3</b>
Population, total (millions)	<b>3</b>	<b>32</b>	<b>20</b>
<i>Source: World Bank Data and Research, 2006</i>			

The government of Mongolia is committed to incorporate ICT services and applications in health, education, banking, customs and taxation systems. However,, the plan to improve communications until 2020 foresees little progress in teledensity rates and access to internet both at national and local level (*Table 2*). The targets shown in *Table 2* are modest and may reflect the reality that the majority of rural population are too poor to afford internet services. Besides financial limitations, rural

***Table 2: The national plan for developing communications by 2020, per 100 inhabitants***

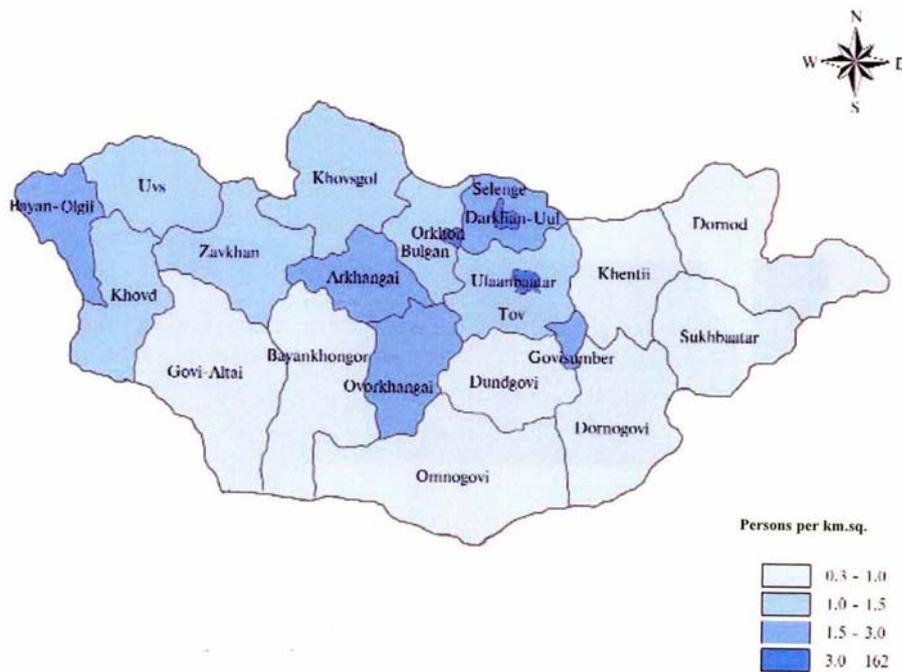
<b>Indicator</b>	<b>In 2003</b>	<b>By 2020</b>
National teledensity	<b>6.95</b>	<b>11.64</b>
Number of internet users, national level	<b>0.37</b>	<b>6.60</b>
Rural teledensity	<b>5.70</b>	<b>9.92</b>
Number of internet users, rural areas	<b>0.03</b>	<b>3.77</b>
<i>Source: GoM, 2004(b):21</i>		

people face many other challenges such as a language barrier to access the internet and the lack of online local content in addition to infrastructure problems such as the lack of electricity. Consideration of these challenges is important as international experience shows that ICTs alone do not aid development and their potential should not be overestimated (Garforth and Norrish, 2002). Therefore, direct access to ICTs will not provide a solution for isolated rural areas at present income levels, but their effective use through intermediaries might be the way to make a start. It is worthwhile to examine the option for introducing ICTs in rural Mongolia through intermediaries considering that teledensity and internet access will remain quite low even when the government programmes are completed. Discussion of a potential intermediary will be raised later in the paper.

## Social isolation and the “information hunger”

Provision of better information and communication services for the 41 percent of Mongolia’s population living in rural areas is significant in view of the social isolation. Social isolation is caused by the low population densities and the traditional nomadic lifestyle of the rural people in Mongolia. Mongolian herders organize their labour independently with camps usually isolated from social, cultural and trading centres and far from other daily services (Shombodon, 1996).

**Figure 1: Population density, by Aimag and capital city, 2000**



Source: MHDR (2004)

During the transition to market economy (1990-present) the well-organized supply of social services and information has collapsed leaving major gaps between rural and urban communities. UNDP’s special report noted “the tyranny of distance” reflecting the sharp emergence of urban-rural disparities (MHDR, 2004). Rural areas became short of regular supplies of publications. Many of the local media outlets have closed down and the

national radio and television turned into the primary sources of external information. The postal system has weakened with subscriptions delivered to the Soum centres through a post office and not to individual households. Today the newspapers reaching households are at least a week old when they are delivered by a Bag governor or herders' visit to a Soum centre (UNDP, 2000). A recent study showed that 51.5 percent of herders receive market information from radio, 15.4 percent from television, 3.0 percent from press, 2.3 percent from the Bag and Soum administration, and 17.0 percent rely on word of mouth (MFE and UNDP, 2004).

Rural population presently experiences a huge gap between its specific information needs and the information provided by the national media. A sample information needs assessment from Uvurkhangai, Dundgobi and Umnugobi Aimags undertaken by UNDP (2000) reveals that the main types of information in demand are: weather, health, family and friends, business/market, government/ law and local/regional news. The national media meet only a few of these demands. For example, health issues constituted as little as 1.5 percent in the content of daily newspapers in 2005 and there were no separate health programmes on the national radio and television (Press Institute, 2006).

On the other hand, local media are slowly growing to fill this gap. The Press Institute of Mongolia (*ibid.*) recorded 37 rural radio stations including 30 FM stations, 42 television stations, 11 cable televisions and 35 local newspapers in 2005. In addition, information provision through the internet has also improved: there were 11 online newspapers with another 85 available online; 8 radio websites, 3 internet radios and 6 television websites in 2005.

### **Information needs for overcoming political and economic isolation**

Information and improved communication are important for overcoming the political isolation presently felt between the local governments and their communities. UNDP's (2000) research revealed that presently there is little communication among rural people on local government policies and services. Cooperation and better understanding between the rural communities and local governments is needed for resolving conflicts and also for managing environmental problems such as pasture overgrazing, deforestation, desertification, loss of biodiversity and damages caused by the growing mining industry.

These problems urgently need addressing through education, training, information and communication targeted at specific rural groups and at the general public. However, this need is unsatisfied at present. In 2005 environmental information comprised only 1.7 percent of the content in daily newspapers, 1.6 percent on the main Mongolian television channels including the national television and 1.1 percent on radio stations including the national radio. Furthermore, the content of the information is too general and needs targeting for specific social groups such as politicians, farmers, herders or youth (ERP, 2006). Rural people are therefore politically isolated as they lack information and knowledge and are unable to participate in policy decisions. Improved information and communication can empower rural societies and ensure that their “voices” are considered in making decisions which affect their livelihoods and the resources they depend on.



*Local market in Uvs Aimag Centre*

People in rural areas are also economically isolated. Rural producers feel the disadvantages of remoteness from markets, high transport costs, and few marketing options with low prices for producer goods, but high price for consumer goods (Mearns, 2004; Morris and Bruun, 2005). Privatization of state property in the 1990s created different

economic groups in rural areas: wealthy, those “with means”, the poor and the very poor (Mearns, 2004). The majority of the poor express demand for credit and financial programmes; however, they lack the collateral and also the knowledge on how to use the loan (MFE and UNDP, 2004).

Government extension services and donor projects provide training for herders, small farmers and women. Many of them use a variety of local media to disseminate their messages. However, sustainability of their activities has been a critical issue, a point which will be picked up later in the paper. Moreover, impact assessment on the training and communication programmes is lacking; therefore, their effectiveness remains questionable.

### **“Information hunger” - a cross-cutting issue**

“Information hunger” is apparent in rural Mongolia. It became especially apparent after the transition to a market economy in 1990 as the old systems collapsed and new structures emerged slowly. Demand for information remains largely unsatisfied in rural areas. Development of telecommunications can provide access to a wide range of information and contribute to economic growth, human development, environmental sustainability and good governance. Access to modern information and communication technologies, however, should be provided through intermediaries at current teledensity and income levels of the rural population.

### **ICT Support in Agriculture and Rural Development**

ICTs are generally defined as information-handling tools – “a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information” (UNDP and Elsevier, 2005). They can be classified into “old” or conventional technologies such as radio, television and telephone and “new” technologies which include computers, satellite and wireless technologies and the internet.

The development of modern ICTs especially computer- and internet-based technologies started in the mid-1990s. At the same time, management and organization of rural information and knowledge systems required major changes following the emergence of private extension services, a shift from top-down to demand-driven approaches and an increased concern for the environment (Garforth *et al*, 2003). Furthermore, market liberalization in the developing countries, decentralization of public services, focus on grassroots development and empowerment demanded new skills and knowledge from extension and rural development workers, for example, in the areas of communication, adult education and multidisciplinary organizational learning. Under these changing conditions, modern ICTs, especially the internet, appeared to provide a solution for development.

### **Conventional ICTs in agriculture and rural development**

Conventional ICTs include radio, television, telephone and fax machines and are widely used in agricultural extension. Radio is probably the most commonly used mass media in

extension due to its accessibility for farmers in rural areas and low cost compared to television. It is also a powerful communication tool which offers the reach and the relevance of content to farmers' needs (Chapman *et al*, 2003). Recent developments in using radio for rural development and agriculture include not only delivering technical messages, but also informing farmers on market prices, sources of agricultural inputs and access to credit. In addition, phone-in or write-in programmes, where farmers can call the programme and receive answers on specific subjects have proven popular among farmers and useful for directing extension services in Uganda (Oryokot, 2003).

Television is used rather sparingly compared to radio mainly due to the costs and accessibility in rural areas. On the other hand, use of video materials for disseminating extension messages and training farmers on new technologies is high. Carefully produced training videos are in high demand especially if they have local content and languages. However, there is a lack of assessment on the effect of videos on adoption of the new technologies. Other shortcoming includes lack of electricity in rural areas which limits the opportunity to view and learn from the videos (Green, 2003).

Fixed-line telephones are spread thinly in rural areas in developing countries and there is little ownership by the poor or subsistence farmers. Generally, fixed lines are used by commercial farmers for maintaining contacts with extension officers and agri-businesses as for example in the case of Fiji (Prakash, 2003). The use of mobile telephones is discussed below.

### **Modern ICTs and their application for agriculture and rural development**

The use of modern ICTs is at an introductory stage in many developing countries. This is related to poor infrastructure, high telecommunication tariffs, lack of funding and high reliance on donor-driven efforts which lack sustainability as, for example, in Africa (Kiplang, 2003). On the human resources side, local extension workers lack awareness of the potential of ICTs and have limited computer skills. In addition, lack of political support in this regard has been mentioned by many extension organizations in the developing countries (CTA, 2003).

On the other hand, there has been significant development where market demand for agricultural products required higher monitoring of original stocks for example in the case

of a technology called Livestock Identification Trace-back System using radio frequency to capture data on individual cattle in Botswana (Burger, 2004). Similarly, field data acquisitions for crop production are becoming important for the traceability reasons. Traceability of crop products requires that information must be easily traced to the original farming conditions, for example, to varieties, pesticide use, harvest dates and producer names. Collection of this type of data is widely supported by modern ICTs (Ninomiya, 2004).

ICTs have become useful tools in classical biological control of pests and in integrated pest management. A project supported by the International Fund for Agricultural Development (IFAD) in Suriname and French Guiana successfully used satellite technology to target infested areas in eradicating the Carambola fruit fly (Mathur, 2003). Modern ICTs are also known for their potential to empower rural communities where the beneficiaries learn to use computers and projection equipment and combine digital photography and internet for diagnosing and giving advice for crop diseases (Laureys, 2006). Three ICT projects in India effectively promote e-governance, improve marketing services for cooperative members and introduce new practices for agricultural production (Meera *et al*, 2004).

Direct access to ICTs by farmers, extension workers and researchers is encouraged in a number of countries. In China, regional extension stations have websites with information on the local economy as well as on demand and supply of agricultural products (Riggs *et al*, 2004). Extension officers in Papua New Guinea have become able to access a wide network for agriculture-related information using the internet (IAALD, 2006a).

Use of mobile phones in agriculture has been limited, although early experiences are being reported. The Philippine farmers are now able to access information via mobile phones and short message service (IAALD, 2006b). In Japan, mobile phones with internet connection are used as substitutes for personal computers to support farmer decisions. For example, farmers may access weather database through their mobile phones and check weather condition in their fields. Farmers here also benefit from pesticide warning system through mobile phones (Ninomiya, 2004).

Finally, international cooperation for sharing knowledge and facilities is well underway in Asia. The Asian Federation for Information Technology in Agriculture (AFITA; <http://www.jsai.or.jp/afita/>) and the Agricultural Working Group of the Asia Pacific Advanced Network consortium (APAN/AG-WG; <http://www.apan.net/>) hold international conferences on the use of ICTs in agriculture and support education, research and information exchange through their high performance network.

### **Lessons learnt**

Application of ICTs in agriculture and rural development has grown intensively, particularly in countries with high development indicators. The use of these technologies can save labour in agricultural production; improve marketing; facilitate access to information; and ensure fast and effective communication.

However, the adoption of ICTs in agricultural extension and other rural knowledge and information systems has been moderate throughout the world. Very often this is related to the hardware- and technology- driven programmes and the lack of human capacity to utilize the technologies. Michiels and van Crowder (2001) criticise the lack of monitoring and evaluation and the assessment of the beneficial impact in ICT projects. Similarly, a recent report from the World Bank (2005) stresses the fact that there is limited data on the impact of e-development and that rigorous monitoring and evaluation is required for effective strategies. In this context, it can be articulated that the national extension systems should have a clear strategy on using ICTs to achieve extension objectives.

The use of ICTs in agriculture and rural development needs to consider the issue of cost effectiveness. Presently, it is difficult to make cost and benefit estimations (Michiels and van Crowder, 2001) which reflects the mismatch between the expectations of the ICT providers and the rural communities and the pertaining shortage of valuable information. In addition, the content and selection of ICT tools have been unsatisfactory due to the lack of capacity in local institutions. Hence, future ICT programmes should be intended to build local capacity to create locally appropriate information.

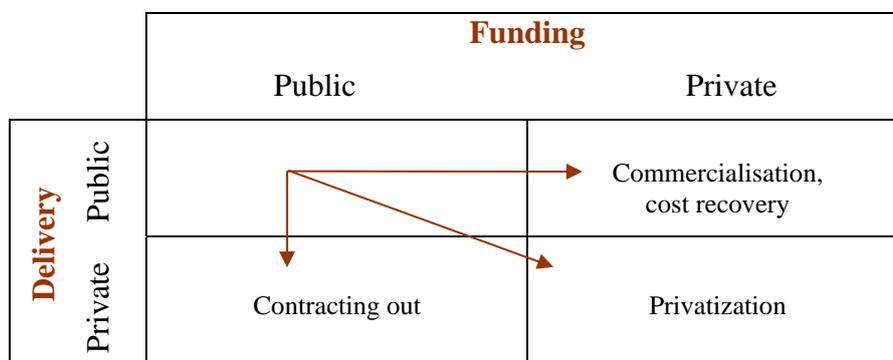
## Extension Reforms and Agricultural Extension in Mongolia

### Reforms in agricultural extension

Agricultural extension services worldwide have been undergoing major reforms since the late 1980s. This is associated with the changes in a wider development context such as the increasing demand on food production, growing concern for poverty alleviation and environmental sustainability (Leeuwis, 2004).

Following these reforms extension approaches are changing from top-down, supply-driven, “technology transfer” models towards demand-driven and cost-effective options. Extension reforms include a variety of opportunities for financing and delivering extension and advisory services. These can be viewed within a funding-delivery matrix shown in *Figure 2* which illustrates the decline in public role for funding and delivery of extension services and an increased share for private and non-governmental sectors.

**Figure 2: Trends in the funding and delivery of extension and advisory services**



Source: Garforth *et al* (2003:324)

Variety in funding and delivery options leads to pluralism in extension services and can be efficient as the different needs of the different customers are met by a choice of suppliers (Christoplos, 1996). Quality assurance and equity are important considerations in the pluralistic approach in extension as poor farmers critically need information and advice, but may not be willing and able to pay for them (Mulhall and Garforth, 2000). In terms of delivery of the services, modern extension services require extension workers to be highly skilful in communication, ICTs and adult education. Finally, extension organizations are

transforming into “learning organizations” to cope with the changes taking place in the environment they operate.

### **Extension services in Mongolia**

Many of the international trends such as pluralism have already found roots in Mongolia while others such the extension approach is in the “change” process. The Mongolian experience of extension services is relatively new. It was introduced in Mongolia in 1996 to support the agricultural sector. Establishment of agricultural extension centres (AECs) in rural areas was assisted by donors and aimed at providing training, specialist advice and information to farmers and herders.

Extension services must deal with diversity among agricultural producers resulting from privatization of state farms in the 1990s. Presently, there are large commercial crop farms as well as new, small scale vegetable growers; herders owning large herds of livestock and those with few animals for subsistence. Demand for extension and information services from these producers is immense, but their needs vary greatly. On the other hand, the agricultural producers have common needs particularly for social services which deteriorated after 1990. These demands need to be researched in detail to ensure efficient and effective supply of extension services.

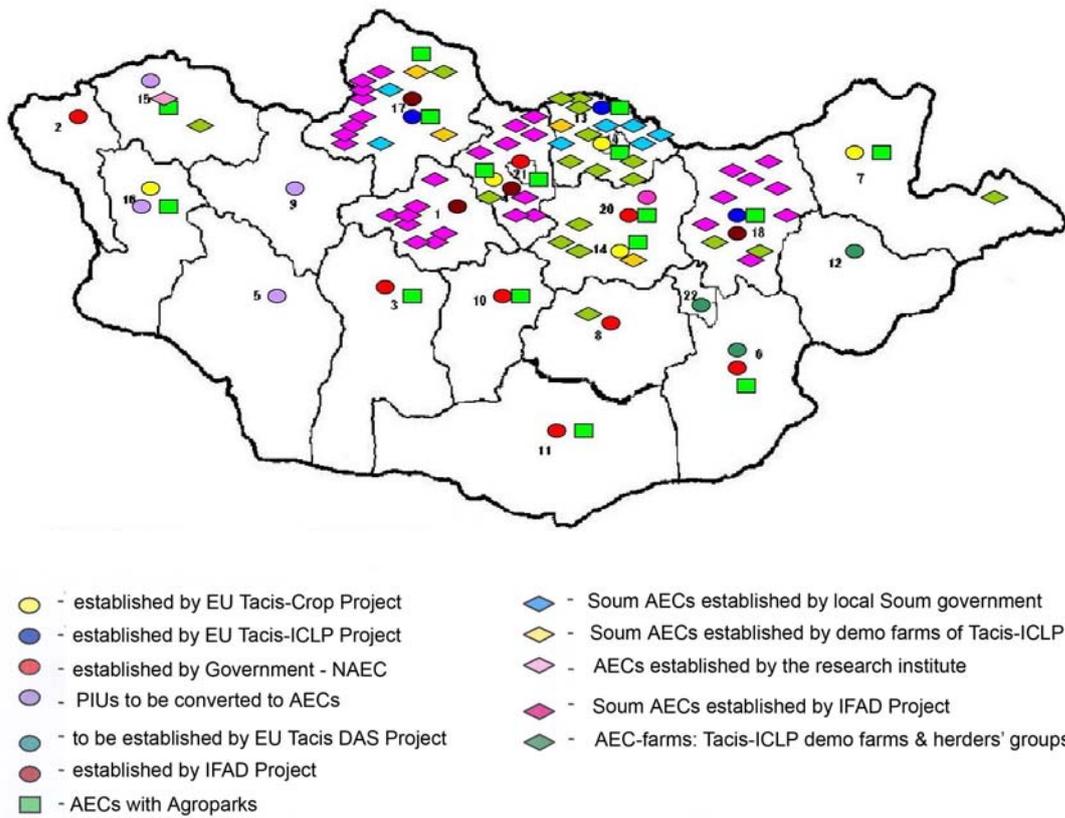
Presently, extension service is unable to meet the above needs. This is despite the presence of plural actors supplying extension services. Pluralism in the funding and delivery of extension services in Mongolia has developed over the last ten years. National Agricultural Extension Centre (NAEC) is the first official extension organization in Mongolia established in 1996 by a recommendation from Asian Development Bank (ADB). It is a government organization funded by the Ministry of Food and Agriculture. Presently NAEC has a network of extension centres in 21 Aimags and 127 Soums. The long-term aim of the Ministry is to establish extension centres in all



*AEC in Erdenebulgan Soum, Khuvsgul Aimag*

Soums (MFA, 2003). Several of the Aimag level extension centres were established by NAEC and others with assistance from international donor organizations such as the EU-Tacis programme, ADB and IFAD (*Figure 3*).

**Figure 3: Network of agricultural extension centres in Mongolia**



Source: *Buyandelger, 2004b*

NAEC serves as an “umbrella” organization for directing and coordinating extension services in the country. However, assuming this role is difficult due to the differences in funding for the local extension centres, the extent of their accountability to NAEC, variations in their legal status and quality of the services. Donor projects fund the majority of the training and extension activities which are delivered free of charge for farmers and other beneficiaries. This creates a top-down flow of information which can be justified by the reforms in agriculture and establishment of AECs as a disaster relief action. On the

other hand, local extension centres are already adopting demand-driven approaches to ensure their self-sustainability in the future. For example, AECs funded by Tacis-ICLP offer services such as writing business plans, leasing agricultural equipment and photocopying for a fee. Farmers become willing to pay for these services and useful training courses provided that the quality meets their needs (Buyandelger, 2004b).

*Table 3* gives an overview of the present extension approach in Mongolia.

However, the top-down structure in agricultural extension services in Mongolia raises critical issues of efficiency and effectiveness. Training courses are usually one-off events where experts come from Ulaanbaatar and which results in the lack of follow-up and continuity at local level. Programmes delivered by various projects have overlapped in timing, place and subject matter (*ibid.*). Impacts of radio and television programmes to support extension services are not assessed because donors evaluate their performance against their plans and not against the results achieved as for example in the case of IFAD's Rural Poverty Reduction Programme (MFA, 2005).

**Table3: Extension approach practiced by NAEC and local extension centres**

<b>Dimension</b>		<<	<	<>	>	>>	
Enterprise	single commodity					X	whole livelihood
Clientele	target category					X	all households
Means of influence	enforcement			X			problem solving
Objectives	technology transfer		X				organization
Scale of decision	individual		X				group/ community
Scope of service	information			X			and material inputs
Payment	clients pay			X			free to clients
Agency delivering the service	Public			X			Private
Flexibility of approach	Inflexible		X				Adaptable
Skills deployed	Soft				X		Hard
Cost	Cheap				X		Expensive
Sources of funds	Public			X			Private
Direction of information flow	top-down		X				bottom-up

Source: Table adapted from Garforth *et al* (2003).

Coordination of extension activities by the NAEC is also difficult due to the lack of local participation in the design of donor projects. At the implementation stage, projects are reluctant to adjust programmes in response to local proposals from NAEC or local extension centres which contributes to inefficiency. Thus there is a need to develop local capacity which would improve the effectiveness of extension programmes and support coordination among the stakeholders.

Presently, extension capacity in Mongolia is weak in terms of human resources, but relatively strong in terms of facilities and equipment. NAEC employs 12 full time staff and about 60 freelance advisors and scientists from different agricultural disciplines. In rural areas, each extension centre has a manager and 6-7 freelance local advisors making the total of approximately 120 technical advisors (MFA, 2003). Extension workers both at NAEC and at field level come from “hard” technical backgrounds: they are agronomists, livestock specialists, veterinarians, economists and engineers (Radnaaragchaa, 2002). The first field-level extension officers were trained with assistance from the University of Reading within two projects funded by EU Tacis programme from 1999-2001 and 2002-2005 (Northridge, 2004). However, expansion of the extension network and recruitment of new personnel requires further training for current and future staff members. According to the recent training needs assessment conducted by FAO (2005) extension staff both at central and local levels lack basic knowledge on extension and need training on principles of adult education, extension approaches and methodologies, efficient use of multi-media supporting materials and management of extension programmes (planning, monitoring and evaluation). This also implies the need for training on “soft skills” which include communication skills, computer literacy and foreign languages. Extension workers in Mongolia have little opportunity to learn English, which limits their capacity to interact with non-Mongolian organizations and hinders their learning from international experiences. Mongolian State Agricultural University teaches extension as a part of its graduate programmes, but the teaching staff is few and teaching materials are in short supply (Northridge, 2004).



“Mobile” AEC

Donor assistance in developing extension services in Mongolia results in relatively well-equipped extension centres with modern communication facilities. Office equipment includes computers, internet connection, fax machines, telephones, printers and photocopying machines.

In addition, some extension centres have land and dairy units for use in demonstration activities and also for generating income. Both farm and office equipment can be used for cost recovery (Buyandelger, 2004a). Seven extension centres have transport for providing “mobile services” to remote areas. The remaining extension centres provide services from the office and in the nearby fields (Radnaaragchaa, 2002). Despite the availability of facilities, extension managers are not able to make the best of their resources. For example, those who run farms spend most of their time on their land and little time is available for the actual extension work. Information sourcing and learning through the internet is constrained by the lack of English (Buyandelger, 2004a). Information dissemination is also limited due to the lack of the ICT expertise: the extension centres are unable to create their own websites and other local content for the wider public.

Weak local capacity and the inadequate use of resources undermine the effectiveness and threaten the sustainability of training and extension activities. The Tacis-ICLP project concluded that self-sustainability of the extension centres is not viable at present and that extension should be funded from public sources (Buyandelger, 2004a). Government funding can be justified under the recent trend agreed by the Ministry of Food and Agriculture and the donors that extension services should change the agricultural focus towards the wider meaning of “rural extension” (MFA, 2005). This means that Mongolian agricultural extension centres can develop as rural information and communication intermediaries. This role is appropriate for the extension centres as their network is presently the largest operational system in Mongolia to deliver information and training to rural citizens. Moreover, international trends in extension and advances in ICTs support this opportunity.

## **Extension as a rural information and communication intermediary**

The new role of rural information and communication intermediaries requires extension workers to gather and process information actively. In other words, extension organizations have to become active “seekers” of information and “translators” between the different information sources. Within their new role, extension officers can obtain information from the sources which are difficult to access and make it available for a wider use. This can contribute to building an “information society” aspired by the government. ICTs can greatly facilitate the process of storing, processing and accessing information as discussed earlier.

On the other hand, modern and traditional ICTs are already being used for rural development in Mongolia. Past experiences render a number of useful lessons and confirm that ICTs should be introduced to rural communities through intermediaries such as extension services.

One of the most progressive users of ICTs in rural Mongolia is the Gobi Initiative Project funded by USAID. The project’s focus on developing rural business has resulted in “Market Watch” – multi-media price information and analysis services. The design and content of the programming are highly appreciated by the rural audience (MercyCorps, 2005). The commercial orientation of the project has created users who are willing to pay for the market information in the future (*ibid.*) therefore sustainability can be anticipated.

However, another two examples show that sustainability is difficult to achieve even if ICTs are successfully introduced for the rural population. The main reason for failure was the lack of funding as the users were not able to pay and cover the costs of operation after the projects had finished. “Learning for Life” funded by DANIDA took place in 11 Aimags from 1997 to 2001 providing opportunities for non-formal and distance education for youth and adults. The follow-up evaluation study (UNESCO, 2003) revealed the success of the educational and health programmes. However, the network of learning centres established by the project had collapsed by 2003 due to the lack of funding.

The second project established Community Information Centres in nine Aimags to improve communication and information exchange between citizens and local governments. The centres were set up in 1998 with funding from UNDP and Mongolian Forum for Open Society (MFOS). The MFOS funded the centres within their project called Cyber Aimag, which connected the local library, schools, the justice department and the radio station through internet. However, as the users have not been able to pay for the services only one out of the nine centres continued its operations when the MFOS funding stopped in 2004 (Johnson *et al*, 2005).

Therefore, sustainability is a crucial concern in applying ICTs for rural areas. The government's plans to use ICTs for building an "information society" need careful investment decisions based on the review of the constraints and opportunities.

It can be summarized that the extension networks in Mongolia have sufficient facilities to become rural information and communication intermediaries, but the staff skill level and the organizational capacity need improvement. In order to become rural information and communication intermediaries, extension centres need to improve the use of available ICTs and learn new skills. Extension workers together with assistance-providers will need to research local audiences and carefully design communication strategies to achieve maximum results.

It is, however, acknowledged that extension cannot serve as the only channel of information flow in rural areas. As markets develop or as information becomes more available, there will be a greater need for specialised information; therefore, pluralism in the delivery of information might become more suitable in the Mongolian context in the longer run. However, the effective and efficient solution in the short and medium term might be developing extension services in their new role for rural development.

## **DISCUSSION**

It has been argued that the effect of isolation in rural development in Mongolia has been different before and after 1990. Inequalities between rural and urban areas have grown after the transition to market economy in 1990 in comparison with the previous socialist period. Under market economy conditions poverty, environmental degradation and

declining productivity in agriculture have become major problems for rural livelihoods. Moreover the rural population is in critical need for improved information and communication systems to overcome political and economic isolation. Modern technologies such as mobile telephony and internet offer a number of solutions to the problems. Experiences from applying these technologies for development have shown that they are best introduced to rural areas through intermediaries. These would be organizations that can function as “bridges” between local communities and external knowledge and information systems. That agricultural extension services could become such an intermediary in the context of Mongolia is proposed, though there are problems, as discussed below.

### **Capacity building**

Future efforts for providing information in rural Mongolia should aim at building local capacity to ensure effectiveness and sustainability of information provision activities. Presently, much of the investment into providing information in rural Mongolia is made with donor assistance. This has proved ineffective.. As noted by Korten (1980), public donors experience high pressure for quick results and therefore tend to invest in capital and technology intensive projects rather than in building institutional capacity. This explains the past projects in Mongolia heavily investing in ICT hardware, but little in building human capacity to exploit it. The view suggested herein is to build capacity in extension services despite the fact that resources will be needed over a long period with interim results that are difficult to measure. This may contradict the interests of ongoing projects. On the other hand, planning a new project based entirely on communication-based solutions for development problems is prone to failures due to wrong assumptions, poor design or implementation and lack of political support (Hornik, 1988). In this context, capacity in extension organizations can be developed through a “learning process” approach which can be a “gain-gain” situation for the stakeholders involved. It can meet the information needs of the rural population, suit the capacities of the extension services and help the assistance-providers achieve their objectives. This approach developed by Korten (1980) versus the blueprint design projects has the advantages of succeeding when solutions to the problem are not straightforward; it provides flexibility and adaptation to changing circumstances; allows consideration of local solutions and ensures “sustained action” over a long period. This way of delivering assistance enables the development of “learning organizations” which embrace error and link the new knowledge to action and

this is where the new extension services are striving to arrive. Thus “learning process” approach seems to offer a better fit for harnessing ICTs into development efforts and a small-scale piloting can be a starting point for implementing this approach.

### **Funding**

The most critical consideration in the overall challenge of isolation and the lack of information in rural Mongolia is funding. One option would be to channel the aid intended for improving rural areas’ access to information through agricultural extension centres. The basic idea for this opportunity was raised during the workshop on the long term development of extension services in Mongolia held in September 2004 (Tacis-ICLP, 2004). This approach can provide harmonization and sustainability of project outcomes in areas of non-formal adult education, basic health advice and information, poverty alleviation, environmental awareness raising and empowerment of rural communities. Agricultural extension centres at the Aimag and especially Soum level can become the points of contact for farmers and herders where, for example, they can meet a variety of experts to discuss business or legal issues and also pick-up a brochure on nutrition for the family rather than going for it to a medical centre.

This approach provides a workable solution in view of the small and dispersed populations in rural Mongolia. In this case, projects can coordinate with local extension managers on the timing, subject matter and methodology of training when planning a training programme in their particular locality. NAEC, in turn, would provide regular in-service training for local extension managers on coordination and facilitation skills. Extension managers will have the opportunity to strengthen their social networks through employing local experts in short term consultancy for projects. This system can provide continuous learning and local capacity building. Hiring capable experts locally would enable donors fulfil their tasks with greater effectiveness and efficiency resulting, for example, from savings on travel costs of bringing experts from Ulaanbaatar.

Another opportunity of funding might come from the government resources especially from those planned for development of ICTs. The master plan “ICT Vision-2010” foresees provision of computers to schools, hospitals and government offices and support to business entities for using ICTs. Telemedicine and distance learning are being developed; however the efforts seem to lack linkages with the agricultural extension services. The

limitation here is that the plans concentrate on delivery of hardware (equipment and infrastructure) aiming at computer literacy for all (Ariunaa, 2003; Enkhjargal and Batjargal, 2004), but few details are available on how it will be achieved for rural adults. Therefore, agricultural extension services need greater national support for delivering information and training for rural populations.

### **Sustainability**

The funding and the legal status of the agricultural extension centres can affect the sustainability of activities. The review of the current situation of extension centres in Section 4 showed uncertainty in the future of the local extension centres. As full cost-recovery is not possible at present income levels of rural producers, extension centres are highly dependent on external funding for their operations. Once donor assistance finishes and if government will not provide further support, many of them are in danger of closing down as have other rural information centres. Private extension centres bear especially high risks as their customers are unable to pay for the services and external funding is difficult to obtain under current arrangements. This situation threatens the existence of many extension centres which have already absorbed considerable investment. On the other hand, extension centres constitute the most extensive network of rural information centres presently available in Mongolia therefore their capacity to serve as intermediaries for ICT penetration should be utilized for greater efficiency.

### **CONCLUSIONS**

Isolation is critically affecting rural communities in Mongolia. It is difficult to change the geographic and social isolation which is inherent in the country's large territory and a small population. However, the organization of political and economic systems needs careful consideration of equity and sustainability of investments. Urban and rural disparities have increased after the country's transition to market economy in 1990. The majority of the rural population have become poor and lack information and knowledge to improve their livelihoods. They find it difficult to fully participate in the political and economic life of the country without regular provision of knowledge and information. This situation undermines the overall socio-economic development of Mongolia. The "information hunger" is one of the priority needs to be addressed. ICTs are an important opportunity for overcoming isolation and the lack of information. However, providing

direct access for rural communities is not a sustainable option as the rural poor cannot afford the internet and other communication costs. Therefore, ICTs should be utilized through an intermediary such as agricultural extension services which will connect each particular locality with the external knowledge and information systems. However, the extension capacity needs to be improved to harness the benefits of ICTs; for example, staff need training on communication and the use of media for development purposes. Funding remains to be a critical issue. It is suggested that channelling the aid intended for improving rural areas' access to information through agricultural extension centres. In this way, local extension centres can be the information and communication intermediaries representing their respective areas when cooperating with external organizations. Successful incorporation of ICTs in extension will allow the following improvements in the delivery of the services:

- Extension centres become rural information and communication intermediaries;
- Information in health, education and environment sectors is integrated;
- A shift is made from sectoral approach to territorial approach.

Thus, extension services can become “learning organizations” in the process of introducing ICTs for rural communities. They can create demand for local media and build up sustainable information and communication networks. With development of markets and higher teledensity and access to internet in rural areas, a greater variety of deliverers of information and training can be foreseen. In the shorter term, extension services can play a significant role in reducing isolation in Mongolia but it must be a broader national effort.

## **ACKNOWLEDGEMENTS**

I would like to thank my lecturers Dr. Chris Garforth, John Northridge, Derek Shepherd and Dr. Chittur Srinivasan for the insights that have contributed to this paper. Special thanks are for Dr. Chris Garforth for the patience, encouragement and motivation he provided as a director of my study programme and a supervisor for the dissertation.

In Mongolia, the following people kindly gave their time and provided invaluable assistance in obtaining data and information: Malcolm Hazelman from FAO, B.Uranchimeg from UNDP Mongolia, I.Chuluunkhuu from the Ministry of Social Welfare and Labour and “Agriculture Tomorrow” newspaper and D. Bat-Erdene from the Ministry

of Food and Agriculture. I am grateful to my husband Bayartulga Lkhagvasuren for the physical delivery of the documents from Mongolia and the moral support he gave throughout my study.

I am deeply thankful to the Rotary Foundation for the award of the Rotary Ambassadorial Scholarship, and the International and Rural Development Department, University of Reading, headed by Dr. Howard Jones, for the financial support which enabled this study. Special thanks are for the Geography Department of the University of Reading and editor Dr. Antoinette Mannion for publishing the findings of the study.

## REFERENCES

- Ariunaa, L (2003) *Information and Communication Technology Policy in Mongolia*. Research on ICT Policy in Mongolia. Mongolian Foundation for Open Society. [online] Accessed (25/07/2006) at <http://satjournal.tcom.ohiou.edu/pdf/issue05/ariunaa.pdf>
- Bayasgalan (n.d.) *Surfing the Internet from a 'Ger'?* IT4DEV [online]. Accessed (29/5/2006) at [http://www.it4dev.net/media\\_articles/mongolia.htm](http://www.it4dev.net/media_articles/mongolia.htm)
- Burger, T (2004) *LITS: Tracking Botswana's livestock using radio waves*. ICT Update. Issue no. 15 of January 2004. Accessed (22/04/2006) at <http://ictupdate.cta.int/index.php/article/view/275>
- Buyandelger, T (2004a). *A final report on AEC activities between 2002-2004 within Tacis-ICLP project framework*. Ulaanbaatar. EU-Tacis ICLP Project.
- Buyandelger, T (2004b) *Summary of extension activities implemented by EU-Tacis Projects on "Crop Development" and "Integrated Crop and Livestock Production" from 1999-2004*. PowerPoint presentation for Workshop on "Long Term Development of Agricultural Extension Services in Mongolia" held in September 2004 in Ulaanbaatar, Mongolia. EU-Tacis ICLP.
- Chambers, R (1983) *Rural Development: Putting the Last First*. London. Lagos. New York. Longman.
- Chapman, R, Blench, R, Kranjac-Berisavljevic, G and Zakariah, A B T (2003) "Rural radio in agricultural extension: The example of vernacular radio programmes on soil and water conservation in Northern Ghana". *Agren*. Network paper no. 127. ODI
- Christoplos, I (1996) "Poverty, Pluralism and Extension Practice." *Gatekeeper series*. No.SA64. London. International Institute for Environment and Development (IIED) Available on the IIED website at: <http://www.iied.org/docs/gatekeep/GK64.pdf>

CTA (2003) *ICTs-transforming agricultural extension?* CTA's ICT Observatory Agricultural and Rural Development Workshop held in the Netherlands in September 2003. Accessed (1/05/2006) at <http://www.cta.int/observatory2003/documents.htm>

Enkhjargal, S and Batjargal, A (2004) *Information Technology in Mongolia for the year 2004*. [online] Accessed (25/07/2006) at [www.unescap.org/icstd/events/WSIS\\_2nd\\_Phase/docs/Papers/MONGOLIA.doc](http://www.unescap.org/icstd/events/WSIS_2nd_Phase/docs/Papers/MONGOLIA.doc) ?????

ERP (2006) *Survey Report on Improving Citizens' Environmental Knowledge through Media*. Ulaanbaatar. Environmental Reforms Project. World Bank. Ministry of Nature and Environment. Press Institute. [online] Accessed (03/08/2006) at <http://www.pressinst.org.mn/bos.pdf>

FAO (2005) *Training needs assessment survey. Data tabulation and analysis*. Ulaanbaatar. Unpublished. Resourced from FAO Project on "Strengthening the training and information capacity of the Agricultural Extension Services for agriculture and rural development in Mongolia" in Ulaanbaatar, Mongolia

Garforth, C and Norrish, P (2002) *Introduction to "Listening and sharing: making knowledge and information work for development"*. Given as a class handout for module on "Communication for development processes". IRDD. The University of Reading.

Garforth, C, Angell, B, Archer, J, and Green, K (2003) "Improving access to advice for land managers: lessons learnt from case studies in developed countries". *Agren*. Network paper no. 125. ODI. ISBN 085003 638 0.

GOM (2004a) *Millennium Development Goals: National Report on the Status of Implementation in Mongolia*. Ulaanbaatar. The Office of the President and Ministry of Foreign Affairs of Mongolia. Accessed (29/05/2006) at [http://mirror.undp.org/mongolia/publications/NMDGR\\_Mongolia\\_eng.pdf](http://mirror.undp.org/mongolia/publications/NMDGR_Mongolia_eng.pdf)

GoM (2004b) "Монгол Улсын мэдээлэл, холбооны салбарын бодлого, зохицуулалтын өнөөгийн байдал, цаашдын хөгжлийн үзэл баримтлал /концепц/". [Current status of policy and regulation in information and communication sector of Mongolia and concepts for future development] Ulaanbaatar. Ministry of Infrastructure.

Green, V (2003) *Production of agricultural videos*. Prepared for "ICTs –transforming agricultural extension?" CTA's ICT Observatory for ACP Agricultural and Rural Development Workshop held in the Netherlands in September 2003. Accessed (1/05/2006) at [http://www.cta.int/observatory2003/case\\_studies/Case\\_study\\_Samoa.pdf](http://www.cta.int/observatory2003/case_studies/Case_study_Samoa.pdf)

Hornik, R C (1988) *Development Communication: Information, Agriculture, and Nutrition in the Third World*. New York. London. Longman.

IAALD (2006a) *Agricultural information of Papua New Guinea accessible though shared system*. International Association of Agricultural Information Specialists. [online] Accessed (28/03/2006) at <http://iaald.blogspot.com/2006/02/agricultural-information-of-papua-new.html>

- IAALD (2006b) *Filipino farmers to access agricultural information and technologies through SMS*. International Association of Agricultural Information Specialists. [online] Accessed (28/03/2006) at <http://iaald.blogspot.com/2006/03/filipino-farmers-to-access.html>
- ITU (1999) *Challenges to the Network. Internet for Development*. Executive Summary. International Telecommunications Union. Accessed (29/01/2006) at [http://www.itu.int/ITU-D/ict/publications/inet/1999/chal\\_exsum.pdf](http://www.itu.int/ITU-D/ict/publications/inet/1999/chal_exsum.pdf)
- Johnson, C A, Ariunaa, L and Britz, J J (2005) “Constructing the Pillars of a Knowledge Society: The Challenge of Providing Access to ICTs in Rural Mongolia.” *Libri*, 2005. Vol. 55, Pp. 216-224.
- Kenny, C (2002) “Information and communication technologies for direct poverty alleviation: Costs and benefits”. *Development Policy Review* 20 (2). Vol. 20, No. 2, Pp. 141-157 (17).
- Kiplang, J (2003) *Does agricultural extension have a new beginning because of ICTs? Reflections on experience from Sub-Saharan Africa*. Prepared for “ICTs – transforming agricultural extension?” CTA’s ICT Observatory for ACP Agricultural and Rural Development Workshop held in the Netherlands in September 2003. Accessed (1/05/2006) at [http://www.cta.int/observatory2003/keynote\\_papers/Keynote\\_Africa.pdf](http://www.cta.int/observatory2003/keynote_papers/Keynote_Africa.pdf)
- Korten, D (1980) *Community Organization and Rural Development: A Learning Process Approach*. Washington DC. A Ford Foundation Reprint from Public Administration Review.
- Laureys, F (2006) *Overcoming rural infrastructure barriers*. Information for Development. Accessed (28/03/2006) at <http://www.i4donline.net/articles/current-article.asp?articleid=546&typ=Features>
- Leeuwis, C (2004) *Communication for Rural Innovation. Re-thinking Agricultural Extension*. 3<sup>rd</sup> Edition. Oxford. Blackwell.
- Mathur, S (2003) *Using ICTs to eradicate the Carambola fruit fly*. ICT Update. Issue 11. May 2003. Accessed (22/04/2006) at <http://ictupdate.cta.int/index.php/article/view/195>
- Mearns, R (2004) “Sustaining Livelihoods on Mongolia’s Pastoral Commons: Insights from a Participatory Poverty Assessment”. *Development and Change*. Vol. 35, No. 1, 2004. Pp. 107-139. [online] Accessed (22/07/2006) at <http://www.livelihoods.org/lessons/docs/Mongolia1.pdf>
- Meera, S N, Jhamtani, A and Rao, DUM (2004) “Information and communication technology in agricultural development: A comparative analysis of three projects from India”. *Agren*. Network Paper No. 135. ODI.
- Melkote, S and Steeves, L H (2001) *Communication for development in the Third World : theory and practice for empowerment*. London. Sage.
- MercyCorps (2005) *Annual Report on Activities – 2005*. MercyCorps Mongolia [online]. Accessed (18/06/06) at

[http://www.mercycorps.org.mn/documents/GoM%202005%20Activities%20Report\\_eng.doc](http://www.mercycorps.org.mn/documents/GoM%202005%20Activities%20Report_eng.doc)

MFA (2003) *Mid-Term Development Program for Agricultural Extension Services*. Ulaanbaatar. Unpublished. Resourced from Ministry of Food and Agriculture of Mongolia

MFA (2005) *Consultative meeting between the Ministry of Food and Agriculture and donors on "International Cooperation in the Food and Agriculture Sector and its Future Perspectives"* June 6-7, 2005. Ulaanbaatar. Ministry of Food and Agriculture.

MFE and UNDP (2004) *Малчдын хөрөнгийг эдийн засгийн эргэлтэнд оруулах арга замын үнэлгээ*. [Evaluation of the ways to put herders' assets into economic rotation] Ulaanbaatar. Ministry of Finance and Economy. UNDP. Poverty Research Unit.

MHDR (2004) *Human Development Report Mongolia 2003: Urban-rural disparities in Mongolia*. Ulaanbaatar. Government of Mongolia. UNDP.

Michiels, S. I. and van Crowder, L (2001) *Discovering the "Magic Box": Local appropriation of information and communication technologies (ICTs)*. FAO. Accessed (30/04/2006) at [http://www.fao.org/sd/2001/KN0602a\\_en.htm](http://www.fao.org/sd/2001/KN0602a_en.htm)

Morris, E and Bruun, O (2005) *Promoting employment opportunities in rural Mongolia*. Bangkok. International Labour Office. Subregional Office for East Asia.

Mulhall, A, and Garforth, C (eds.) (2000) *Equity implications of reforms in the financing and delivery of agricultural extension services*. Final Technical Report on research project R6470. The University of Reading, March 2000. Available on the IRD website at <http://www.rdg.ac.uk/IRDD/researchfiles/R6470FTR%20Final%20Version.doc>

Ninomiya, S. (2004) "Successful Information Technology (IT) for Agriculture and Rural Development." *Extension Bulletin*. No. 549. Ibaraki, Japan. Food and Fertilizer Technology Center.

Northridge, J (2004) *Report on the Short Term Consultancy: Agricultural Extension Training*. The University of Reading. EU-Tacis Integrated Crop and Livestock Production Project.

NSOM (2004) *Mongolian Statistical Yearbook- 2003*. Ulaanbaatar. National Statistical Office of Mongolia.

Oryokot, J (2003) *Provision of agricultural information and knowledge to farmers in Uganda under the National Agricultural Advisory Services: The role of ICTs*. A country case study prepared for "ICTs – transforming agricultural extension?" CTA's ICT Observatory for ACP Agricultural and Rural Development Workshop held in the Netherlands in September 2003. Accessed (1/05/2006) at [http://www.cta.int/observatory2003/case\\_studies/Case\\_study\\_Uganda.pdf](http://www.cta.int/observatory2003/case_studies/Case_study_Uganda.pdf)

Prakash, K S (2003) *A country case study: Fiji*. Prepared for "ICTs – transforming agricultural extension?" CTA's ICT Observatory for ACP Agricultural and Rural

Development Workshop held in the Netherlands in September 2003. Accessed (1/05/2006) at [http://www.cta.int/observatory2003/case\\_studies/Case\\_study\\_Fiji.pdf](http://www.cta.int/observatory2003/case_studies/Case_study_Fiji.pdf)

Press Institute (2006) *Monitoring Mongolian Media 2005*. Ulaanbaatar. Research and Information Department. Press Institute of Mongolia.

Radnaaragchaa, D. (2002) *ХААҮШИҮОHTөвийн товч танилцуулга*. [An introduction to NAEC]. Unpublished. Resourced from NAEC in Ulaanbaatar.

Riggs, M, Hazelman, M, Weike, L (2004) *Information services in rural China. Field surveys and findings*. FAO. RAP Publication. Accessed (2/05/2006) at [http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/docrep/007/ad504e/ad504e00.htm](http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/007/ad504e/ad504e00.htm)

Shombodon, D. (1996) “The division of labour and working conditions of herdsmen in Mongolia”. In Humphrey, C and Sneath, D (1996) *Culture and Environment in Inner Asia: Volume 1. The Pastoral Economy and the Environment*. Cambridge. The White Horse Press. Ch. 9. Pp. 209-237.

Tacis-ICLP (2004) *Additional comments talked at the end of the workshop*. Proceedings from conference on “Long-term Development of Agriculture Extension in Mongolia” held in Ulaanbaatar on 23 September 2004. EU-Tacis “Integrated Crop and Livestock Project”.

UNDP (2000) *Remote Area Access to Information. A Project to Broaden and Deepen Rural Peoples Access to Information*. Working Paper. [online] Accessed (22/07/2006) at [http://mirror.undp.org/mongolia/publications/access\\_to\\_information.pdf](http://mirror.undp.org/mongolia/publications/access_to_information.pdf)

UNDP and Elsevier. (2005) *Regional Human Development Report. Promoting ICT for Human Development in Asia: Realizing the Millennium Development Goals*. New Delhi. UNDP and Elsevier. Accessed (30/04/2006) at [http://hdr.undp.org/docs/reports/regional/ASP\\_ASIA\\_PACIFIC/South\\_East\\_Asia\\_2005\\_en.pdf](http://hdr.undp.org/docs/reports/regional/ASP_ASIA_PACIFIC/South_East_Asia_2005_en.pdf)

UNESCO (2003) *Surch Amidarya – Learning for Life. Non-formal Basic Distance Education in Mongolia: Impact Evaluation – June/July 2003*. UNESCO [online]. Accessed (15/07/06) at <http://unesdoc.unesco.org/images/0014/001448/144849e.pdf>

World Bank (2005) *E-development. From excitement to effectiveness*. Prepared for the World Summit on the Information Society. Tunis. November 2005. Accessed (2/05/2006) at [http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2005/11/08/000090341\\_20051108163202/Rendered/PDF/341470EDevelopment.pdf](http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2005/11/08/000090341_20051108163202/Rendered/PDF/341470EDevelopment.pdf)

World Bank Data and Research (2006) *Statistics by Topic*. [online] Accessed (1/08/2006) at <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/0,,menuPK:476823~pagePK:64165236~piPK:64165141~theSitePK:469372,00.html>