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Constructing the Pillars of a Knowledge Society: The Challenge of Providing Access to ICTs in Rural Mongolia

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Globalization has resulted in a shift away from the economics of things towards the economics of information, where access to ICTs has reduced the disadvantages of distance and location. Advanced industrialized countries have been at the forefront of this shift and have been able to influence governments to institute policies that have made globalization possible. At the same time, lower income countries have been at a disadvantage in adapting to this new paradigm. Before poor countries can fully benefit from the positive effects of access to ICTs they must first develop a knowledge society. For a society to become a knowledge society and to be part of the economics of information, it must meet four interrelated criteria which we refer to as the four pillars of the knowledge society. These include: ICT and connectivity, usable content, infrastructure and deliverability, and human intellectual capability. In this paper we examine how one developing country, Mongolia, is approaching the challenge of developing a knowledge society. We concentrate on its efforts to construct one of the pillars – ICT and connectivity. The paper looks specifically at the challenges in providing access to ICTs in the vast rural areas of Mongolia where more than half the population still follows a nomadic herding lifestyle. We conclude that despite a positive policy environment for developing ICTs and limited success in extending Internet connectivity into the rural towns, the prospect of integrating these services into the social and business practices of rural communities remains a long way off. Future research needs to go beyond economic and technological factors and focus on the social and cultural implications of incorporating ICTs into traditional societies.

Introduction

Globalization has resulted in a shift away from the economics of things towards the economics of information. The resulting open markets, competitiveness and the increasing interrelationship between societies and economies have benefited some, while other countries have been left on the far side of an increasing digital divide. Advanced industrialized countries have been at the forefront of this shift and have been able to influence governments to institute policies that have made globalization possible. At the same time, lower income countries have been at a disadvantage in adapting to this new paradigm. Although globalization makes it easier than ever to produce, advertise, sell and deliver products across the globe, to do this well economies must achieve a high level of investment in technological innovation, knowledge production, research and development and higher education. A number of knowledge society indicators have been developed in order to understand when economies can take profitable advantage of the benefits of globalization. These include, access to information and communication technologies (ICTs), number of scientists in a country, amount spent on research and development, production of high technology,

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number of patents filed and the number of articles published in scholarly journals (World Bank Group 1999; United Nations University 1998; Mansell & Wehn 1999).

Although we agree with most of these indicators, we prefer to define a knowledge society as a society that operates within the paradigm of the economics of information. A knowledge society is well connected via modern ICTs to the digital economy, and has access to relevant and usable information. A well-developed physical infrastructure allows the delivery of the material objects that are accessed and manipulated in the digital world of modern ICTs. And finally, it values human capital as the prime input to production and innovation. Therefore, in order for a society to become a knowledge society and to be part of the new economics of information, it must meet these four interrelated criteria, which Britz and Lor (2005) refer to as the four pillars of a knowledge society. They are described in more detail below.

- ICT and connectivity
  Participation in a knowledge society in the era of the information economy is based on connectivity to modern ICTs. The backbone of a knowledge society is therefore a well-developed, well-maintained and affordable information infrastructure that allows access to, and manipulation of the digital economy.
- Usable content
  Access to, and accessibility of information to enable participation in the digital economy alone is not enough. The information available should be affordable, available, timely, relevant, readily assimilated, and in a language users can understand. There is a critical mass of useful information needed to be available on the Internet before people will use the Internet on a regular basis.
- Infrastructure and deliverability
  What many policy makers forget is that this new digital or "dematerialized" economy is underpinned by a "materialized" and top-heavy infrastructure comprised of airports, railways, roads, trucks, warehouses and physical addresses of people. A dematerialized economy without a physical infrastructure is of little use and can even create unmet expectations. For instance, if a local crafts cooperative establishes a website to advertise their products but there is no way for interested buyers to pay for the products online or have the products delivered to them, then the digital infrastructure is meaningless in the sense of contributing to the local economy.
- Human intellectual capability
  The development of human capital represents one of the most important factors that facilitate development and economic growth. Of relevance here is the concern expressed by Freeman and Soete (1997) that, if developing countries do not invest more in education and specifically in R&D, they will be excluded from the triadic knowledge and innovation networks, which are mainly concentrated in North America, Europe and Asia. A knowledge society needs people who can create as well as utilize knowledge to ensure not only sustainability, but also prosperity.

In this paper we will focus on just one of the pillars – ICTs and connectivity – and a case study of how one developing country, Mongolia, is meeting the challenge of providing access to ICTs in the rural areas.

The challenge for Mongolia

Mongolia has been isolated from the rest of the world for most of its recorded history. While under the domination of the Qing Dynasty, from the 17th Century until 1911, few Westerners visited Mongolia. During the communist regime, which began in 1924 and lasted until 1990, Mongolia was essentially a closed society as most Westerners were barred from visiting Mongolia as it moved increasingly into the Soviet fold. With the collapse of the Soviet Union and the adoption of free market reforms and a democratic form of government in the early 1990s, Mongolia set its course on becoming an independent, self-reliant member of the global economic community. Currently it is one of the most stable countries in Central Asia with power transferring peacefully following each of four elections held since 1992 although each one resulted in a change of government. A poll conducted in 2002–2003 indicated that nearly 68% of respondents believed that the country had achieved at least a limited democracy and over 70% believed that Mongolia was irrevocably moving towards full democracy (Damba and Tseveen 2003).

Nevertheless, fifteen years after the adoption of free market reforms, Mongolia is still suffering from high unemployment rates, conditions of poverty for nearly a third of the population and an underdeveloped economic and information infrastructure. In 2004, the Gross National Income was $480[1], which has increased at the rate of about 2% per year since the late 1990s (World Bank Group 2005). Part of the reason for Mongolia's underdevelopment can be explained by history and geography.

Mongolia is a vast country of 1.6 million square kilometers and a population of 2.7 million, of

which one million live in the capital city of Ulaanbaatar (Central Intelligence Agency 2004). Outside the city of Ulaanbaatar the population density is one person per square kilometer. The country is divided into 21 aimags (provinces) and 340 soums (counties). Over a third of the population still follow a traditional nomadic lifestyle herding sheep, goats, horses, camels and other cattle. Communication between the herder households and the aimag centers where services and markets are located is difficult because of the distances involved and the fact that there are few paved roads, and telecommunication systems do not extend into the countryside. The vast distances and sparse population in the rural areas have proven to be the greatest challenge to development, what the United Nations Development Programme (UNDP) calls the "tyranny of distance" (UNDP 2003, 1).

During the communist era, Soviet development policies transformed Mongolia from a feudal theocracy into a partially urbanized and industrialized economy. In addition, social welfare policies that provided universal access to healthcare increased the life expectancy from 47 to 63 years of age between 1960 and 1990 (UNDP 2003, 18). The introduction of compulsory education for everyone including the children of nomadic herders resulted in an almost total literacy rate of 99% by the last decade of the 20th century. Also during this period libraries were established throughout the country, from the State Central Library in the capital city of Ulaanbaatar, to libraries in each of the aimag centers and many of the soums. Printing presses were also established in the aimag centers and local newspapers produced. In the 1960s, Mongolia National Television and Radio was broadcast to most of the country. Although the information that flowed along these channels represented only the point of view of the Party, the people were generally well informed and in touch with what was happening throughout the country (UNDP 2003, 33).

During transition this structure has nearly fallen apart. Local printing firms have become unsustainable. There are no daily newspapers published in the aimags, and the bi-monthly papers that are published are printed in Ulaanbaatar resulting in a delay of two to three days before the papers can be delivered, thus limiting the currency of the news reported (Munkhmandakh & Nielsen 2001, 8). In addition, the centralized book distribution system set up during communist times has disappeared and there is no systematic way of delivering books and newspapers to the countryside (Government of Mongolia 2001, 1–4). While Mongolian National TV reaches nearly 98% of Mongolian territory this does not mean that it is watched. Residents of many soums do not have access to electricity, although herders are increasingly making use of satellite dishes and generators. In addition, local TV stations operate under very poor conditions. For example, one local aimag station operates for only 90 minutes each week. The programs are produced live on tape and then the tape brought to the transmitter on a nearby hilltop to be broadcast. The broadcast range is usually limited to the area around the aimag centre (Munkhmandakh & Nielsen 2001, 25). Most nomads, however, have access to radio, which has proven to be an important source of market information (Munkhmandakh & Nielsen 2001, 7).

ICTs and connectivity

In the last five years, the Government of Mongolia and development organizations based in Mongolia have focused on the use of ICTs as a strategy to further economic development by connecting Mongolia to the outside world and the global information infrastructure, as well as connecting the rural areas to information services based in Ulaanbaatar (Mongolia Development Gateway (MDG) 2003, 1). In 1999, the Government of Mongolia, supported by the Mongolian Foundation for Open Society (MFOS) and the UNDP, held their first national ICT summit. Following this, a National ICT committee was created which was comprised of representatives of the government, non-government organizations (NGOs), and private organizations, and an ICT advisor to the Prime Minister was appointed (Ariunaa 2001a). However, the position was not full time and there was almost no communication between him and the National ICT Committee. At this time, ICT-related issues were the responsibility of the Department of Roads, Transportation, Information, Communication and Tourism in the Ministry of Infrastructure where there was only one full-time staff member responsible for ICT issues (Ariunaa 2001b). Despite the lack of resources expended

for ICT development by the government, in February 2000 the *ICT Vision 2010* policy document was adopted by the Parliament of Mongolia. The mission of the policy was to develop "a knowledge-based society to improve the quality of lives of the citizens" (Labelle 2000). The main thrust of the policy was to provide state support to improve the telecommunications infrastructure and to expand the use of ICTs throughout every aspect of the economy and government administration. A report produced by the MFOS in 2001 identified three of the major problems faced by the ICT infrastructure in Mongolia (Ariunaa 2001b): 1) there was no legal environment for the development of ICTs; 2) there was no active governing body overseeing ICT infrastructure; and 3) there was no competition in the telecommunications market. These findings were supported by the Mongolian Development Gateway evaluation of ICT development in Mongolia which also emphasized the need to improve access to ICTs in rural areas and to reduce the technological gap between urban and rural areas (MDG 2003).

The ICT sector has shown continued growth throughout the 1990s and early 2000s. In 2004, Mongolia ranked ninth in Asia in e-readiness indicators, ahead of Indonesia, Vietnam, Myanmar, Cambodia, Laos, and Timor-Leste. Globally, its ranking rose from 103rd in 2003 to 75th in 2004. Internet centers have been established in all aimag centers and a few soums, and most aimag and soum centers have cellular coverage. Both Internet and mobile telephone service has expanded through the efforts of private companies with little involvement of the government, although government control of the telecommunications backbone, through majority ownership of the Mongolia Telecommunications Company (MTC), has hampered expansion of services to meet market demand (Information and Communications Technology Authority (ICTA) 2005).

Telecommunications backbone

The development of the telecommunications backbone is the responsibility of the Mongolian Telecommunications Corporation, which is majority owned by the Government of Mongolia, although plans have been in place for several years for the privatization of the corporation. During the past five years, all aimag central telecommunications networks have been converted to digital technologies, while the soum centers are gradually being upgraded from manual analogue switching systems to digital switches. MTC also operates 23 VSAT stations throughout the country. In addition, RailCom, the Mongolian railway authority, operates a large part of the fiber optic cable network in Mongolia. This company has made an aggressive entry into the country's telecommunications market, especially after signing agreements with TransTelecom (Russia) and China Unicom to connect the northern and southern terminals of its network to the networks operated by Russia and China. RailCom leases its fiber cable network to the private mobile phone operators and Internet Service Providers (Ariunaa 2005a).

Expansion of cellular telephony

Growth in cellular telephony has been very high since introducing mobile services in 1997, with over 450,000 subscribers throughout the country in 2004 (ICTA 2005). Cellular telephony is available in all of the aimag centers and some of the larger soum centers from either of two private mobile operators, MobiCom and SkyTel. A barrier to extending service to the countryside is the policy of requiring the private operators to sub-lease lines from the MTC. In order to reduce costs and extend services, the private companies have been compelled to build their own duplicate lines thus adding unnecessary costs to the provision of service (Owen 2005, 16).

Access to Internet

According to a survey conducted in 2003, there were 175 Internet Cafes in Ulaanbaatar, 46,000 individual Internet accounts (both private and commercial) and approximately 140,000 users, 95% of which were in Ulaanbaatar (Ariunaa 2005b). By 2004, Internet cafes were established in the telecommunications offices of all the aimag centers by the MTC. In contrast, out of the nine Community Information Centers (public access Internet centers) established by the UNDP and MFOS in rural towns, only one is still functioning today. The next section gives some background on the establishment of these centers and the factors leading to their demise.

Community Information Centers

Community Information Centers (Cisco) were first established in Mongolia in 1998 with funding from the UNDP and MFOS. In total, nine centers were established in rural Mongolia, six by the UNDP and three by MFOS. The motivation for establishing the centers was to provide a place where citizens could raise questions and get information from the local government office. For this reason five out of the six UNDP centers and one of the MFOS centers were located in aimag government offices. The remaining centers were located in the local public libraries. Currently, only the CIC located in the public library at Dornod is working.

The experience of a CIC located in Dalanzadgad in the South Gobi aimag illustrates some of the difficulties faced by the public access centers. The Dalanzadgad centre was established by MFOS in 1999 in the local public library and supplied with four computers. In 2002, as part of the Cyber Aimag project, MFOS donated five more computers. Under the Cyber Aimag project, the library was connected to three schools, the justice department and the radio station through high-speed radio modem connections with the server located in the public library. According to the librarian and centre director, when the centre opened many adults came out of curiosity to see what the new technology could do, but most did not come back. Only those adults with children abroad or in Ulaanbaatar used the centre to send emails. The majority of users were high school students who used the centre to send emails to one another or to chat. [2] The Centre also offered Internet lessons and training on software applications to customers at a cost of about $2 for children and $4 for adults for a two-day course. Funding from the MFOS ended in 2004 when it changed its mandate away from funding projects to supporting policy development. According to a monitoring report of the MFOS centers conducted in 2004, the outstanding debt owed the telecommunications company by this centre was $5,087, which was beyond the ability of the library to pay (Ariunaa 2004). Although the aimag government supports the centre in principle, it has not yet been able to raise the funds to take over financial responsibility for the centre, despite approaching local businesses and a Canadian mining company operating in the area to help with the funding. The computers and the centre are still in good condition and the librarians are enthusiastic about continuing the Internet service but it is doubtful that the centre could be self-sustaining in the near future. The library's budget is about $16,000 a year, which barely covers heat and maintenance and staff salaries. Even with this amount the library has to rely on donations to purchase new books.

Reasons for failure of the MFOS centers

The MFOS monitoring team led by L. Ariunaa found that one of the main problems besetting the centers was their failure to establish a common fund, to which the various organizations that made use of the CICs would contribute, to cover the Internet connection fee. The centers were also advised to come up with an alternative strategy to relying on MFOS funding to sustain the centers. Two suggestions were to establish either a business model where full costs would be recovered from users or to create an aimag-wide NGO to negotiate better prices from the Service Providers. These suggestions were not taken up by the centers. The one centre that is still operating in Dornod was able to establish a common fund that included a Regional Diagnosis centre and the aimag power centre. Nevertheless, the fund is only able to cover the running costs of $960 per month, on a month-by-month basis. The monitor report also noted that there was a lack of professional managerial and technical capacity in the CIC and the managers were unable to see beyond the immediate concerns and plan for the future growth and direction of the centers.

With the establishment in 2004 of Internet centers in the local telecommunications offices, which are subsidized by MTC and the Government of India, serious questions have been raised about the sustainability of the CICs. The cost of using the centers has to remain low in order to compete with the telecom centers, which charge about 50 cents an hour. When this fee is multiplied by the average number of hours the Internet is used (estimated at 170 hours per month at the Dalanzadgad centre), the $85 fees collected fall far short of the over $900 required to cover the monthly connection costs. While telecom centers serve a useful purpose in providing Internet access, it

does not appear that they go beyond this narrow mandate except to provide some technical assistance to local schools. [3]

Despite the availability of Internet in the aimag telecom centers, there appears to be little use made of it beyond email. For instance, workers at a newspaper in Tsetserleg in Arkhangai aimag, save their page layout files on a portable pen drive which they send to Ulaanbaatar via regular mail where the newspaper is printed and sent back to Tsetserleg. This may be because the computers they were using did not have the capacity to send such large files by email attachment. There is also little evidence that the Internet is used to sell products produced in the countryside or purchase goods produced in Ulaanbaatar. Baasanjav mentions that some people in South Gobi were interested in selling products like Oriflamme and "mylexus" cosmetics, which could be ordered through the Internet (2003, 12). However the market for these relatively expensive products was small and the lack of credit card payment systems in the countryside made it difficult to manage such a business. Nevertheless, the Internet promises to be the ideal technology to overcome the "tyranny of distance" in the Mongolian countryside. Access to current news and government information, the ability to transact government business and to sell and purchase products over the Internet and to participate in distance learning courses will considerably reduce the growing digital divide between urban and rural areas. Although funding is a crucial element in fulfilling this promise, it is just as crucial that government policies support this vision and provide the regulatory environment to encourage private investment.

New ICT strategy

A renewed emphasis on the use of ICTs in development has occurred with the election of a new coalition government in June 2004. The force behind this emphasis is the new Prime Minister, Ts. Elbegdorj, who received his Masters in Public Administration at the Kennedy School of Government at Harvard University in 2002. Elbegdorj credits his experience in the United States with giving him an appreciation of the importance of technology in creating open governments and greater government efficiency. In a statement made to fellow classmate Scott Talan in an interview in January 2005, he stated, "Technology can make us more equal…. Moving toward 'e-government' will improve efficiency… and get rid of paper and the bureaucracy that goes along with it" (Talan 2005).

One of the Prime Minister's first acts upon taking office was to establish the ICT Authority (ICTA). The ICTA consolidates a wide-range of ICT-related functions from various Ministries under the direction and management of a single agency (Owen 2005, ii). The main focus of this agency is to "develop national competitiveness and enhance the quality of public services by establishing an effective, systematic and productive e-Government" (ICTA 2005, 1–2). In their first year of existence the agency has rewritten the 1995 Telecommunications Law and is redrafting the proposed Information Technology Law. The Communications Regulatory Commission (CRC), which was put in place to manage the liberalization of the ICT sector, is now subsumed under the ICTA and thus is considered to be more independent than when it was located within the Ministry of Infrastructure (Owen 2005, 11). Through these new laws, policies, and regulations, the government will encourage the integration of ICTs into all sectors of Mongolian society. If successful, Mongolia hopes to become one of the top ten countries in Asia in the use of ICTs by 2012.

The primary focus of the policy is to integrate all government agencies and departments into one information system. After the internal system is established, the government will focus on providing online government services to citizens. The e-Government Master Plan lists 16 initiatives they will undertake to reach this goal. The major ones include:

- *Provision of a low-cost personal computer.*
  In order to achieve the projected cost of $250 per computer, the government will remove the 15% value added tax and has negotiated with Intel to decrease the cost of the processing unit by 10–20%. Consumers will also be granted low cost loans with low monthly payments to encourage purchase.
- *Improve Internet connectivity*
  The government has negotiated to reduce the cost of access to the international network by half so that Internet speed is doubled from 2mb/sec to 4mb/sec. The nine ISPs have also joined together to form the Mongolian Internet Exchange (MIX) which has allowed it to negotiate with Intelsat satellite link to re-

duce the cost of bandwidth from $6000 a month to $1300. While the private sector is expected to develop wireless, ADSL, and fiber optic connection options, the government will regulate them. A major policy initiative affecting rural connectivity is the establishment of the Universal Service Obligation Fund, which will be funded through a tax on telephone service. In addition, the World Bank has agreed to provide a $5 million soft loan to get the fund started. The fund will be used to expand telecommunication access by encouraging private firms to develop ICT-related services in the more rural parts of Mongolia. (Owen 2005, 13).

- *IT literacy for all citizens*
  A key component to developing a knowledge-based society is a knowledgeable population. The ICTA has acknowledged the importance of creating a computer literate population by focusing on education. The government plans to equip high schools and technical colleges with modern information technology and to use ICT for the delivery of distance education. They will also promote the training of employees in IT by international companies.

Included within the Master Plan are policies that are directly focused on increasing the use of Internet and other ICTs in the countryside. These include:

- reducing the cost of long distance telephone calls;
- developing high speed connectivity between rural centers;
- expanding Internet coverage beyond the aimag and soum centers;
- establishing Digital Community Centers for businesses at bagh, soum and aimag levels; and
- locating free public Internet areas in public places such as airports, railways, auto stations, and cinemas, etc.

The other three pillars of the knowledge society

Despite the positive policy environment for developing ICTs and limited success in extending Internet connectivity into the rural towns, rural residents are not yet using these technologies in meaningful ways that will improve their lives and livelihoods. As stated in the beginning of this paper, a knowledge society is based not only on ICTs and connectivity. Mongolia and other developing countries must also construct the other three pillars before a knowledge society can be realized. The challenges facing the construction of these remaining pillars in Mongolia are huge. *Deliverability* via road, rail or air presents many challenges as only 3.5% of Mongolia's total road network were paved as of 2002 (World Bank Group 2005) and most of the roads in the rural areas are over rough dirt tracks. The railroad mainly travels the north-south corridor from Russia to China, and the national airline only stops in 7 locations outside of Ulaanbaatar leaving vast areas without easy access to the markets of Ulaanbaatar and beyond. *Usable and useful content* on the Internet also remains low as only 1300 domain names (.mn) were registered as of mid-2004 and most of these were for international organizations in Mongolia (Ariunaa 2005a). The small Mongolian speaking population worldwide also limits the amount of information that will be available in their own language. E-commerce has not been widely introduced in the country, with few services available to purchase goods online. Banks, however, have begun to issue credit and debit cards which are getting wide use in hotels, restaurants, shops and bars in the city and it is only a matter of time before these services are made available in the countryside. With the high literacy rate in Mongolia and great value placed on higher learning, the prospect of developing *human intellectual capacity* to function in the knowledge economy is good. However, funds are desperately needed to provide the rural schools especially with computers and the staff training to deliver information technology courses (Enkhjargal & Ariunaa 2003).

Conclusion

Mongolia is a large, sparsely populated and poor country. The new government has recognized that the creation of a knowledge society is critical for economic development as well as for creating a more open society. This paper has focused on one of the pillars of the knowledge society – ICTs and connectivity. It has attempted to show how far Mongolia has come in increasing access to ICTs for its citizens and has described some of the challenges for providing access in the rural areas. While Internet is not widely used in the countryside, this does not mean that it does not have potential for high use in the future. As other forms of ICT, such as radio, television, and cell phones, have expanded into the countryside, they have been widely adopted although the cost relative to incomes has been high. This suggests that when

Internet is easy to use and contains useful content, it too will be accepted and used by rural residents. The policy initiatives undertaken by the current government are a major step in paving the way for integrating Internet use into government and business activities. Nevertheless, it is doubtful that individual ownership of computers, and thus access to Internet through individual accounts, will be commonplace in the countryside for many years to come. In the meantime, therefore, community-based information services need to be developed that will not only provide access to the technology but also educate citizens on how to make the most effective use of the new technologies, software and services. Some questions remain to be answered. For instance, should access to ICTs be a priority in a country where basic needs, such as housing, employment, and healthcare, are still not being met? What are the consequences of opening the country up to outside information and cultural influences? Although Mongolia has managed to retain its essential cultural identity despite the dominance of successive foreign powers, will it be able to withstand the cultural hegemony of the Western dominated media? In short, what moral considerations will shore up these pillars of the knowledge society? Future research needs to go beyond economic and technological factors and focus on the social and cultural implications of incorporating ICTs into traditional societies.

Notes

1. All monetary figures are expressed in U.S. currency.
2. Conversation with Ulmaa, Librarian, Dalanzadgad Public Library, June 2005.
3. Conversation with the manager of the Telecom centre, Tsetserleg, June 11, 2005.

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