*Prometheus*, Vol. 25, No. 1, March 2007

# Closing the Digital Divide: The Role of Services and Infrastructure in Bhutan[1]

KEZANG & JASON WHALLEY

Abstract *Considerable attention has been devoted in recent years to the digital divides that exist between and within countries. Within developing countries, information and communication infrastructures are often limited. This paper focuses on the digital divide within Bhutan. More specifically, the paper identifies two related dimensions of the digital divide in Bhutan—access and skills—and argues that the interaction between geography, resources and services will shape how the divide is tackled.*

Keywords: digital divide; Bhutan; ICT; resources; services.

## 1. Introduction

The nature and size of the digital divide that exists between and within countries has lately attracted much attention.[2] A key motivating factor has been a concern that those without access to information and communication technologies (ICT) will not be able to participate in the global knowledge economy that many believe is emerging. A recent report argued that, overall, the digital divide between developed and developing countries is shrinking, but that the emergence of new technologies makes a lasting solution elusive.[3]

Many developing countries face an uphill battle to narrow the digital divide that they face. Not only do new technologies emerge, but the resources and skills needed are often in short supply. One such country is Bhutan, a mountainous landlocked country located in the Himalaya mountain range. Although Bhutan has witnessed considerable growth in its ICT sector, with services increasingly available across the country, a digital divide remains. However, narrowing this divide is, as Faris[4] and others note, not straightforward.

Consequently, this paper seeks to understand how these challenges may be overcome so that access to and use of ICT can be improved in Bhutan. The remainder of this paper is structured as follows. In Section 2 a brief overview of the digital divide that highlights its complexity is provided, whilst Section 3 offers an overview

*Prometheus* ISSN 0810-9028 print/ISSN 1470-1030 online © 2007 Taylor & Francis
http://www.tandf.co.uk/journals
DOI: 10.1080/08109020601172902

of Bhutan. The focus then shifts in Section 4 to ICT within Bhutan. As most ICT within Bhutan are relatively recent, the focus is largely on the telecommunications industry. At the heart of Section 5 are the trade-offs that exist between resource availability, infrastructure and content (service) provision within Bhutan. Conclusions are drawn in Section 6.

## 2. Digital Divide

At its most basic, the notion of a 'digital divide' can be explained in terms of those who have access to a particular technology and those who do not. This dichotomy is commonly expressed in terms of the 'haves' and 'have-nots'—some in society have access to a technology whilst others have not.[5] The emergence of the term after the growth of the Internet began in the mid-1990s[6] has led to a strong association between the Internet and the digital divide in the minds of many.[7] Such an association is, however, misleading. The term can apply to other ICT such as mobile phones[8] and contains more dimensions than the have/have-not dichotomy implies.[9]

The complexity of the digital divide can be seen in some of the definitions cited in the literature. The OECD[10] defines the digital divide as 'the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to their opportunities to access information and communication technologies and to their use of the Internet for a wide variety of activities'. This definition, along with that suggested by DiMaggio *et al.*,[11] highlights two related aspects of the digital divide: access and use.

In contrast Fink and Kenny[12] draw on the literature to identify four possible interpretations of the digital divide—access to ICT, ability to use ICT, actual use of ICT and impact of use. Given the four different interpretations that Fink and Kenny identify,[13] and the range of different understandings that this implies, it is unsurprising that Rowe[14] states 'the term "digital divide" means different things to different people'.

The complex nature of the digital divide is highlighted by van Dijk[15] and Bertot,[16] who writes that it is 'multi-dimensional, complex and extends beyond access to technology'.[17] In their discussion of the methodological challenges of measuring the digital divide, Barzilai-Nahon[18] and Vehovar *et al.*[19] also highlight its multiple dimensions and complexity. One aspect of the discussion worth drawing attention to is the level of observation/aggregation; high-level observations obscure the differences that may be present at lower levels. In other words, the digital divide is present at the individual, local, community, sector and international levels.[20]

A second issue worth highlighting is that even when a technology may be available, the would-be user must possess a range of skills and experiences that enable them to use the particular technology.[21] Not only does this mean that the initial access digital divide can be compounded by a lack of relevant skills and experience, but that the latter may persist even when the former does not. As the digital divide is not restricted to a single technology a wider range of skills are, by definition, required, thus ensuring that its closure is more challenging and complex than would otherwise be the case. This should not, however, be interpreted as implying that individual technologies are without their own internal complexities. Rice and Katz[22] identify three digital divides—user/nonuser, veteran/recent and continuing/dropout—in their study of US Internet and mobile usage and found that the factors influencing each of the divides were different.[23]

**3. Bhutan**

As shown in Figure 1, Bhutan is located at the eastern end of the Himalaya mountain range and is bordered by China to the north and India to the south, east and west.[24] Since 1961 when Bhutan ended its self-imposed exile, it has joined a range of international organisations such as the South Asian Association for Regional Cooperation and modernised how it is governed. The monarch is no longer the head of the government, with the country governed instead through the Council of Ministers, National Assembly, Royal Advisory Council and sector ministries.[25] A new constitution will be adopted in 2008. Bhutan has a population of approximately 700,000.

Bhutan is perhaps best known internationally for its unique development philosophy of Gross National Happiness (GNH). As articulated by the Fourth King Jigme Singye Wangchuck, 'Gross National Happiness is more important than Gross National Product. The ultimate purpose of the government is to promote the happiness of its people'.[26] GNH places the individual at the centre of all development efforts and is pursued through the four broad platforms of sustainable and equitable socio-economic development, conservation of environment, preservation and promotion of culture, and enhancement of good governance.[27]


*Source*: www.cia.gov/cia/publications/factbook

**Figure 1.** Bhutan.

The most recent five-year development plan,[28] which covers the period 2002–07, prominently features good governance,[29] culture and heritage, etc. and states that GNH is the overarching development philosophy of Bhutan.[30] Although previous plans have transformed the lives of many Bhutanese, a significant proportion of the population live below the national poverty line. As this is incompatible with the principles of GNH, the government has decided that poverty alleviation will be the main development goal of the next five-year plan that runs from 2008 to 2013.[31] Within this plan, ICT will play a key role.[32]

## 4. Information and Communication Technologies

ICT within Bhutan is largely a recent affair. Telecommunications were first introduced in 1963, print media in 1965 and radio in 1973. In the late 1990s, TV broadcasting and the Internet were introduced into Bhutan. Convergence between telecommunications, information technology, broadcasting, etc. is a gradual but visible trend within Bhutan.

This section largely focuses on the telecommunications industry but will refer to other ICTs as appropriate. In the first of the following three sub-sections, an overview of the development of ICT in Bhutan is provided whilst in the second the focus is on the structure of the sector. In the third, a brief overview of telecommunication service provision is provided.

### *4.1. Development*

The government initiated the first telephone network in the country in 1963 and in the following years the network gradually expanded to encompass three non-interconnected pairs of towns as well as, in 1984, an analogue microwave link from the capital Thimphu to Hasimara (in India). In 1989 the National Telecommunications Master Plan for Bhutan was initiated with the support of the ITU and UNDP. From 1991 onwards, the master plan has been supported by Japanese grant aid. Over a seven-year period this plan gave priority to expanding the network into those parts of the country that did not enjoy basic telecommunications facilities. The plan also improved cross-country telecommunications links through establishing an east–west link between Thimphu and Trashigang. By 1999 the modernisation plan was complete. The progressive expansion of the network into ever more remote and isolated parts of the country was a key factor behind the increase in tele-density from 0.3 lines per 100 inhabitants in 1990 to 5.2 in 2005 (see Table 1).

By June 1998, Bhutan had for the first time a national digital telecommunications infrastructure that linked together the government head offices of all 20 Dzongkhags (districts). Since 1998 there have been further changes with the key developments being:

- the upgrading of the east–west link from 34Mbps PDH to 155Mbps SDH;
- the establishment of local area networks in most Dzongkhags;
- an increase in the number of points of presence across the country;
- increasing ICT literacy and awareness;
- improving customer service;
- improved rural coverage; and
- widespread recognition of ICT as an enabler of socio-economic development and political progress.[33]

**Table 1.** Milestones in the development of the Bhutanese telecommunications industry

| Year | Development |
|---|---|
| 1963 | First rudimentary telephone system launched |
| 1972 | Three separate physical wire routes (Thimphu–Phuentsholing, Trongsa–Gelephu, and Trashigang–Samdrup Jongkhar) |
| 1973 | Amateur radio broadcasts commence |
| 1981 | First analogue network established |
| 1984 | First link to outside world launched (from Thimphu to Hasimara in India) |
| 1986 | Bhutan Broadcasting Service radio services launched |
| 1989 | UNDP and ITU funded implementation of the Bhutan Telecommunications Master Plan |
| 1990 | International gateway in the capital city (Thimphu) allowing direct international links for the first time |
| 1991 | Japanese grant aid that made possible National Telecommunications Master Plan received |
| 1994 | International, domestic and local calling possible |
| 1998 | National Digital Telecommunications Network established |
| 1999 | Bhutan Telecommunications Act enacted by the National Assembly<br>Internet and national TV launched |
| 2000 | Bhutan Telecommunications Authority, BTA, established (January)<br>Bhutan Telecom Ltd established (July)<br>Licensing of telecommunications and radiocommunications services introduced |
| 2001 | IP-based rural access pilot project implemented<br>Radio paging services started |
| 2002 | Thuraya mobile satellite services launched<br>First mobile cellular services licence issued |
| 2003 | Ministry of Information & Communications established and also BTA tasked with media and postal regulation as well, renaming it Bhutan Communication Authority (BCA)<br>Initiated drafting of a converged ICT and media Bill |
| 2004 | VSAT-based broadband services started<br>Bhutan ICT Policy & Strategies (BIPS) formulated |
| 2005 | Interconnection and infrastructure sharing framework drafted<br>Bhutan Communications Authority becomes Bhutan InfoComm & Media Authority<br>Bhutan Telecom's exclusive privilege for fixed services abolished<br>Danida-funded Rural Telecommunications Project initiated |
| 2006 | 49% of Kuensel (national newspaper) shares divested and two new private newspapers licensed and operational<br>Nationwide BBS TV broadcast launched<br>The Bhutan Information, Communications and Media Bill submitted to the National Assembly<br>Second mobile licence awarded<br>Dzongkha (national language) Linux launched<br>Local Area Networks for all 20 Districts launched<br>Second FM radio licence issued |

### *4.2. Structure*

Since the turn of the millennium the structure of the Bhutanese telecommunications industry has experienced significant change; from monopoly to competition and from integrated regulation and operation to separated regulation and competition. The most significant institutions to emerge from this transformation are the Ministry of Information and Communications (MoIC) and the Bhutan InfoComm & Media Authority (formerly Bhutan Communications Authority). Bhutan Telecom Ltd (BTL), Tashi Group, Samden Tech Pvt, Ltd and DrukCom Private Enterprise are the licensed suppliers of telecommunications and ICT services. BTL is a 100% state-owned commercial corporation.

The passing of the Bhutan Telecommunications Act in July 1999 separated planning and policy from regulation and operation. The MoIC formulates government policies and plans that affect the ICT and telecommunications industries. The Ministry's policies and plans include results-oriented resource allocation and investment co-ordination. Regulation passed to the Bhutan Telecommunications Authority, which was established in January 2000 'to regulate and promote the development of the Bhutanese telecommunications sector'.[34] In 2003 the BTA changed its name to Bhutan Communications Authority (BCA), which in turn was renamed in 2005 as Bhutan InfoComm & Media Authority (BICMA) to reflect its role as a converged regulatory body.

A key task of the regulator has been to implement the Telecommunications Act of 1999, and in particular the implementation of the licensing regime that this Act heralded. Five-year licenses have been granted to Bhutan Telecom, and to radio frequency users on an annual basis. In addition, a single national paging company has been licensed. Perhaps more significantly, BTA began to formalise the use of spectrum and provision of services. Amateur radio operations have been officially permitted for the first time, and annual licenses granted to 48 cable TV operators in all of the nation's 20 districts. Whilst these actions have formalised markets, the regulator has only recently begun to turn its attention to those issues necessary for the development of competitive markets. For example, it was only with the licensing of the second mobile operator in late 2006 that the location and cost of interconnection with Bhutan Telecom was resolved.[35]

Bhutan Telecom is the monopoly provider of basic telecommunication services. Since its corporatisation in July 2000, Bhutan Telecom has been financially autonomous with the result that it is now operated along commercial lines even though it remains 100% state owned. It was expected that the transfer would result in Bhutan Telecom improving its operating efficiency and quality of service, reducing prices and increasing penetration levels.

Although the period of exclusivity granted to Bhutan Telecom expired in June 2005,[36] it was not until late 2006 that the first significant step to introduce competition into the telecommunications market occurred when a second mobile licence was auctioned. In May 2006 the regulator invited companies to express an interest in the licence, and subsequently provided information on the auction methodology, licence and market conditions.[37] The auction occurred in November 2006, with the winner—Tashi Group—bidding Nu. 777 million (US$17.5 million) for the 15-year licence. Tashi is required to launch its service within a year, and may enter into mobile virtual network operator arrangements with up to two companies.[38] When the licence of the incumbent's mobile affiliate, B-Mobile, expires in July 2007, it will be renewed on the same terms and conditions as the licence awarded to Tashi Group.[39]

Further liberalisation and the likely privatisation of Bhutan Telecom would entail altering Bhutan's policy of cautious engagement with the outside world. Of course, it is by no means certain that privatisation would involve a foreign company. As Table 2 shows, the telecommunications market within Bhutan is comparatively small with just over 33,000 main lines and 37,000 mobile lines at the end of 2005. Having said this, the recent auction of the second mobile licence did involve foreign companies. Of the four companies eligible to participate in the auction, two were joint ventures with Indian companies and one with a Thai company. The successful bidder was the 100% Bhutanese participant. The privatisation of Bhutan Telecom would reinforce the commercialisation of the industry through requiring a commercial rate of return on its investment.

**Table 2.** Basic market characteristics

| Indicator | 1990 | 1996 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|
| Main lines | 1,900 | 6,100 | 17,730 | 20,168 | 23,657 | 30,285 | 33,200 |
| Mobile lines | – | – | – | – | 4,383 | 18,995 | 37,500 |
| Tele-density | 0.3 | 1.1 | 2.4 | 3.2 | 3.7 | 4.7 | 5.2 |
| Fixed waiting list | – | 2,000 | 3,000 | 5,000 | 3,500 | 2,500 | 1,500 |
| Number of PCs | 500 | 1,500 | 4,000 | 5,500 | 7,000 | 9,000 | 11,500 |
| Number of cable TV subscribers | – | – | 5,000 | 9,000 | 13,000 | 18,000 | 20,000 |
| Number of TV channels | – | – | 45 | 45 | 45 | 45 | 35 |
| Number of Internet subscribers | – | – | 1,100 | 1,400 | 1,700 | 3,000 | 4,000 |

*Source:* ICT Annual Report, 2004–05.

### *4.3. Service Provision*

Bhutan Telecom is the sole provider of basic—local, long distance and international—telecommunication services in the country. In addition, Bhutan Telecom also operates DrukNet, which was the only Internet Service Provider (ISP) until 2004 when two VSAT-based ISPs were licensed. The liberalised parts of the ICT market are paging, public calling booths, consumer premises equipment, private networks and cable TV.

International services are provided through Bhutan Telecom's INTELSAT earth station in Thimphu. Unusually for a developing country, international services are not the largest revenue source for Bhutan Telecom.[40] As the two main drivers of international services, tourism and foreign direct investment, are relatively recent developments within Bhutan this is perhaps not a surprise though it does mean that the country is more dependent on other sources of foreign exchange than would have otherwise been the case.

In September 2002 Bhutan Telecom launched the Thuraya mobile satellite service. Bhutan Telecom acted as a reseller for the service, which perhaps due to its relatively high cost enjoyed only limited uptake. However, in late 2003, Bhutan Telecom launched a GSM based service that has proved very attractive to subscribers. The number of mobile subscribers has surpassed initial expectations to such an extent that there are now more mobile than fixed subscribers. Although there are plans to expand coverage, in the east as well as along the Indian border, these subscribers are presently located in the lucrative parts of the country. Moreover, the faster than anticipated growth led many subscribers to complain that service was less than satisfactory. Quite simply, the planned network could not cope with the number of subscribers. This was resolved, in part, by additional investment in urban areas as well as changes to the pricing regime.

## 5. Discussion

Section 2 highlighted the complexity and multi-dimensional character of the digital divide, but it did not provide a definition for use here. The focus here is primarily on access, that is, on encouraging the provision of various ICT so that Bhutanese can enjoy the benefits that they bring. This is not to say that other issues are unimportant, quite the contrary. Without the necessary skills—such as technical and literacy—the productive use of ICT would not be possible.

If ICT are to be available across Bhutan, then challenges in three areas need to be overcome. The first of these is geography, whilst the second is resources. The third area is that of services. The following three sub-sections detail each of these areas in turn, before a fourth focuses on their interaction.

### *5.1. Geography*

The geography of Bhutan raises three obstacles to closing the digital divide. The first of these obstacles is the low population density of Bhutan. The mountainous terrain and the desire to ensure that at least 70% of the country is forest, limits both the land available for agriculture as well as that for urbanisation. Having said this, urbanisation has occurred with Thimphu, the capital city, now accounting for almost 15% of the official population of Bhutan. There is a considerable disparity in tele-density figures between urban and rural areas. According to ITU figures, tele-density in Thimphu stands at 29.70% whilst for the rest of the country it is 0.9%.[41]

Although successive five-year plans have improved the quality of the transportation infrastructure, it is still the case that it takes almost a full day to travel from the capital to Bumthang in the centre of the country and even longer to the eastern border with India.[42] Road infrastructure improvements have until recently focused more on the north–south corridor, though development aid from the Asian Development Bank has partially rectified this historic emphasis.[43]

There is a third dimension to geography that is often overlooked, namely, that several languages are spoken across Bhutan. English is the official language whilst Dzongkha is the national language, and various dialects are spoken across the country. In addition, Nepalese is also spoken in the south of the country. As a consequence, whilst there are languages that are spoken across Bhutan it does not follow that everyone speaks either English or Dzongkha. Thus, different language versions are required of forms, websites, broadcasts, etc. to ensure that information can be understood.

### *5.2. Resources*

Bhutan lacks sufficient financial resources to fund its most recent development plan. A financial shortfall is predicted in each of the five years covered by the ninth development plan. The government intends to meet this shortfall through 'improved tax administration and introduction of new tax sources to broaden the revenue base'.[44]

In addition, the government also hopes that external assistance will help meet the shortfall. Over the course of the eight five-year plans, Bhutan received external aid equalling 60% of the expenditure.[45] This assistance has come from a wide array of sources, including both countries as well as international organisations.[46] With respect to ICT three external donors stand out. India has provided assistance for the longest period, with Japan starting in the early 1990s and Denmark most recently. Whilst Indian and Danish assistance has focused largely on the telecommunications industry, Japan has provided assistance to the broadcasting sector as well. Although the government does acknowledge in the ninth five-year plan that external financial assistance in the past has been generous, no assessment is provided as to whether Bhutan can continue to attract resources in the future to the same extent as it has previously done.

There is also a managerial and entrepreneurial resource gap to be overcome. It is perhaps not surprising that there is a gap given the embryonic state of the private sector in Bhutan. Telecommunication licence applications have, in the past, been refused if they failed to demonstrate sufficient managerial competence. Private sector involvement in the telecommunications sector is, however, evident; not only have VSAT licences been awarded but numerous Internet cafés can be found in Thimphu. It is unsurprisingly small scale as the sector has yet to be liberalised. Outside of the telecommunications industry, there is a comparatively thriving private sector in areas such as cable TV, computer retailing and increasingly content production.[47] In other words, the picture is not as bleak as the telecommunications sector may suggest.

Although it is tempting to suggest that the managerial and entrepreneurial gap is limited solely to the private sector, a managerial resource gap can also be observed in the public sector. The 2005 re-allocation of senior public sector management posts resulted in BCA being left without its director until recently.[48] The re-allocation also demonstrated how extensive the government's involvement in the economy actually is.[49] In some respects this gap is unsurprising. The present generation of senior managers were among the first to be educated after Bhutan ended its self-imposed isolation. Since then education has become more widespread, and the public sector has recruited more graduates into its ranks. Thus, in future years there will be a bigger pool of potential managers to draw from.

### *5.3. Services*

Pek[50] provides an overview of media within Bhutan. From this it can be seen that radio is the most effective media in Bhutan as it reaches the most people of any ICT service. It is estimated that around 60% of the population listen to the radio, with shortwave transmitters covering more of the country than FM.[51] A smaller audience is reached by Bhutan Broadcasting Service (BBS), the state-owned broadcaster. BBS is based in Thimphu, where it has two TV studios and undertakes post-production work. Although BBS broadcasts directly to the Thimphu region, the transmission of its programmes in other Dzongkhags was, until the start of 2006, delayed, as content needed to be transported by road because Bhutan lacked a national broadcasting transmission network.

Japanese foreign assistance has played a key role in the development of BBS. Through this assistance, the production facilities available to BBS have improved and Japanese expatriate managers from NHK work in Bhutan. In addition cultural and scientific content is provided by Japanese production companies that are subsequently dubbed into Dzongkha before being broadcast. This content is effectively free as it is provided under a Japanese–Bhutan assistance scheme.[52] Taken together these have enabled the amount of content delivered by BBS to increase. Around 15 hours a day of radio content is produced in four languages, with Dzongkha accounting for nine hours of this total.[53] TV production is somewhat smaller in scale with only five hours broadcast per day.[54] Initially this content was overwhelmingly informational in focus, but more recently the content has diversified into other areas so today it falls into one of three broad categories—news, entertainment and informational.

Cable-TV was introduced into Bhutan in 1999. Since then the number of operators has increased, and the content delivered received considerable attention. There are now more than 30 licensed operators, with more than 12,000 subscribers

between them.[55] The content that these operators deliver has received considerable attention, with its impact on Bhutanese culture being of particular interest. According to Pek[56] the channels provided within each package were determined by Indian distributors and not by the Bhutanese operators themselves. After complaints from subscribers, BCA specified the minimum number of channels that should be required as part of the package.[57] This effectively broadened the range of content included within each package.

It has been vigorously debated whether the content that cable-TV operators broadcast has affected Bhutanese culture.[58] Anecdotal evidence would suggest that international content has influenced Bhutanese culture; it could also be argued that because there are so few subscribers its impact has actually been relatively limited. Regardless of the exact relationship between international and Bhutanese content, the presence of international content does challenge one of the four dimensions of GNH. As a consequence, the government has sought to encourage the development of domestic content whilst stating it has a preference for educational content.

Internet access is both a service in its own right as well as the facilitator of other services. Given the limited geographical coverage of both the fixed and mobile telecommunication networks, it is not surprising that Internet access is also limited in its scope. In late 2004, it was estimated that rural areas accounted for less than 10% of all telephone connections and fewer than 1% of all Internet connections.[59] Although a range of services could be facilitated by Internet access, the three that are discussed most frequently are education, medicine and government services. The educational benefits of Internet access are readily acknowledged within Bhutan, with these benefits frequently being alluded to in government reports.[60] The government has also acknowledged how these benefits should be available to all, and with this in mind various projects have been suggested that expand ICT into rural areas.

One such project, which was suggested in January 2004, would bring Internet access to 29 communities representing 9% of the rural Bhutanese population.[61] This project is interesting for two reasons. Firstly, it was proposed without the funding being in place and has yet to receive funding. Secondly, the detailed capital expenditure contained within the proposal highlights where capital investment is required. Whilst some capital investment is required to provide access to electricity and/or telecommunication networks, the majority of the expenditure focuses on providing computers, printers, switches and gateways.[62] In other words, access to the national backbone infrastructure can be provided to some communities for a relatively modest capital outlay.

Internet access also facilitates tele-medicine. From the most recent five-year plan, it can be seen that the health of Bhutan has improved though the basic health capacity remains relatively limited.[63] Moreover, specialist care is limited and what does exist is primarily located in Thimphu. In 2000 two hospitals were linked together to share medical expertise, and this has been complemented by innovative uses of technologies such as e-mail.[64] For instance, x-rays have been digitally photographed and then e-mailed to another hospital where a specialist is available. However, if the benefits of tele-medicine are to be fully realised then the underlying telecommunications infrastructure needs to be improved in terms of quality and coverage. The same is true for the delivery of government services. The Royal Government has signalled its intention to deliver improved services through ICT as well as encourage participation in government by the population.[65]

*5.4. The Interaction between Geography, Resources and Services*

Although geography, resources and services have been dealt with separately in the previous three sub-sections, they are in fact inter-related with one another. Some of the inter-relationships that exist are shown in Figure 2. To understand these inter-relationships it is useful to differentiate between high and low population density areas within Bhutan.

It is clear that high population density areas attract investment, as they are where the market for information and communication services is located. This market, in turn, generates financial resources for the investors. In other words, investors are provided with a return on their investment that encourages further investment. The end result is that a relatively broad range of information and communication services are available in high population density areas such as Thimphu and Phuentsholing. In contrast, lower population density areas are less attractive to investors. Lower population densities reduce the financial returns that are possible and increase the costs of service delivery. One aspect of the increased cost of service delivery relates to the cost of the underlying infrastructure whilst another is a delay in service provision. As a consequence, the range of available services is limited when compared to high population density areas.

This difference in service availability between high and low population density areas runs contrary to the notion of GNH in general and development priorities in particular. To reduce the gap in service availability there has been a gradual expansion of information and communication technologies into rural and remote areas. As the fixed telecommunications network has been expanded, other services that rely on this network such as tele-medicine and tele-education have also been introduced into rural and remote areas. Although this has increased the availability of services in rural and remote areas, large parts of the country and a substantial

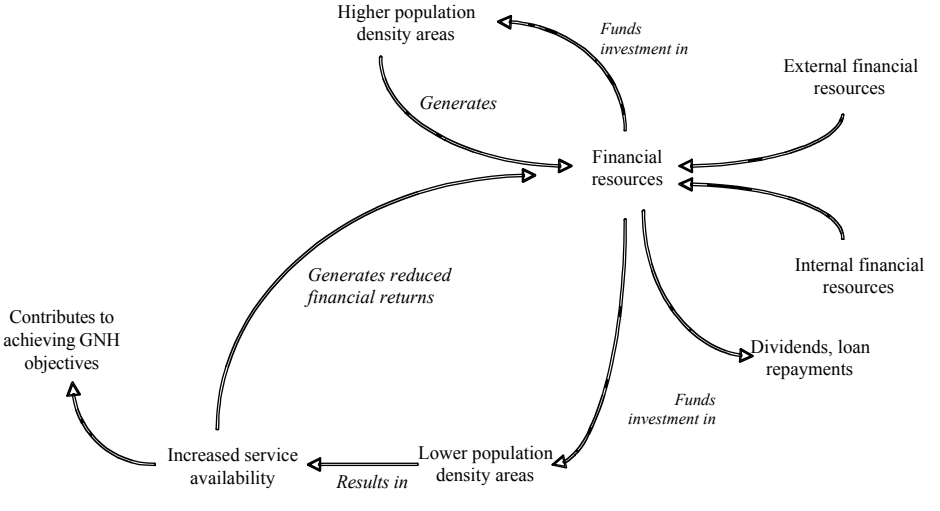


**Figure 2.** Inter-relationships in the Bhutanese information and communication market.

proportion of the population remain without access to services such as voice telephony or the Internet.

A related issue is whether the expansion of the fixed telecommunications network should continue. There are now more mobile than fixed subscribers, and the successful award of a second licence in November 2006 suggests that there is a view that the market will continue to grow for several years to come. There are undoubted advantages to the continued expansion of mobile coverage, not least of which is cost when compared to fixed. However, as B-Mobile seeks to address consumer complaints in its existing markets, resources are likely to be diverted away from network expansion. In addition, the preference for mobile over fixed has implications for those services such as tele-medicine and tele-education that rely on the Internet. It is presently not possible to deliver such services over the existing mobile network, as bandwidth is insufficient. Having said this, it may be possible to combine fixed and wireless technologies. Wireless technologies like WiFi could be used in conjunction with the fixed connections provided to schools and hospitals to widen their availability of the service. Such a combination is, however, likely to require additional investment in the fixed connection so that this does not detrimentally impact on WiFi users.

Although part of the ICT expansion that has occurred has been funded by domestic resources, a key factor has been access to external—foreign—resources. Of particular importance has been the financial assistance provided by foreign governments and aid organisations. Bhutan is not expected to repay the grant element of this financial assistance, but it is expected to repay the loan component. It is arguably the case that it is more straightforward to repay loans when the telecommunications industry remains monopolistic and state-owned. In essence the more lucrative parts of the Bhutanese market generate sufficient financial returns to repay any outstanding loans.

However, this becomes more difficult once the liberalisation of the market has begun and the incumbent operator privatised. Liberalisation has begun within Bhutan, the privatisation of the incumbent telecommunications operator is actively being discussed and the government has decided to sell its holding in *Kuensel* (a national newspaper). This could be taken as suggesting that the strategy of expanding into rural and remote areas is not sustainable given the present resources available within Bhutan. Whilst there is an element of truth in this, this does not take into account the financial resources that the development of hydro-electric power will make available in the near future. These resources could be used to fund the expansion, but the anticipated budget deficit will inevitably limit the amount of resources that are available to expand information and communication networks.

The discussion so far has largely focused on the availability or provision of ICT, yet if their benefits are to be realised they need to be used. To a degree all of the ICT noted above require a range of skills on the part of the user to operate them though this requirement is perhaps more onerous for cable-TV and the Internet than it is for radio, TV and fixed and mobile telephony. Technical skills are required so that, for instance, a household can set-up a TV or the Internet installed at work. If the manual is referred to during either set-up or use then a degree of literacy is required. All ICT equipment in Bhutan is imported. As a consequence, the manual is likely to contain at least an element of English which, when combined with the adult literacy rate (54%) and the range of languages spoken, may exclude some. Having said this, the relatively high primary education

enrolment rate (74%) is likely to reduce the solely English literacy-based exclusion in future years. Literacy, therefore, contributes to the double digital divide that Bhutan faces.

The need for technical skills has already been noted above, but to this should be added user skills that allows them to make best use of the ICT that they have access to. If the Internet is to be used within schools, then teachers need to have a level of user experience that is sufficient to guide their students as well as an awareness of how their teaching should be altered to maximise the benefits that accrue from its use. Familiarity with ICT is also needed by doctors if they are to appreciate the pros and cons of tele-medicine. More generally, the desire of the government to move services online requires everyday users to possess a fairly comprehensive range of Internet and computing skills.[66] Without such skills, government services will no longer be available to all.

## 6. Conclusion

This paper has identified three inter-related factors that shape the nature and scope of the digital divide within Bhutan. The first factor is that of geography, whereas the second is that of resources. The geography of Bhutan is such that population densities vary considerably, with much of Bhutan being sparsely populated. The provision of ICT, both within the more densely populated urban areas as well as in the countryside, requires financial, managerial and regulatory resources. Although Bhutan has been able to generate some of its own resources to address the issue of unequal access to ICT, it has also relied on external (foreign) assistance as well.

On the basis of geography and resources, it is tempting to conceptualise the digital divide within Bhutan as the 'haves' and 'have-nots', that is, those who have access to ICT and those that do not. This is, however, misleading when the third factor—services—is taken into account. Services are made available through a particular ICT, yet for them to be accessed and benefit gained from their use the user must possess a range of appropriate skills. The wider the range of ICT available within Bhutan, the greater the array of skills needed to ensure that the benefits that they bring are enjoyed. Where ICT are present yet the relevant skills are not, the digital divide persists albeit in a different form than was previously the case.

Both the access and skill digital divides have resource implications. Resource allocation is not straightforward within Bhutan, due to a combination of geography, limited resources and GNH. It is not possible to concentrate resources on any one part of the country due to GNH, with the result that those resources which are available are often thinly spread across Bhutan.

## Notes and References

1. The authors would like to acknowledge the financial assistance provided by the Nuffield Foundation Small Grant scheme that facilitated the field research that underpins this paper.
2. See, for example, K. N. Cukier, 'Who will control the Internet?', *Foreign Affairs*, 84, 1, 2005, pp. 7–13; H. E. Hudson, *From Rural Village to Global Village*, LEA, Mahwah, NJ, 2006; International Telecommunications Union, *Measuring Digital Opportunity*, ITU/Korea WSIS Thematic Meeting on Multi-Stakeholder Partnerships for Bridging the Digital Divide, 23–24 June, Seoul, South Korea, 2005; International Telecommunication Union, *World Telecommunications/ICT*

*Development Report 2006—Measuring ICT for Social and Economic Development*, Geneva, Switzerland, 2006; G. Milward-Oliver (ed.), *Mailtland+20. Fixing the Missing Link*, The Amina Centre, Bradford on Avon, England, 2005.

3. International Telecommunication Union, 2006, *op. cit.*
4. C. Faris, *Information and Communication Technology and Gross National Happiness—Who Serves Whom?*, United Nations Development Programme Thimphu, Bhutan, 2005.
5. See J. van Dijk, *The Deepening Divide—Inequality in the Information Society*, Sage Publications, Thousand Oaks, CA and London, 2005, pp. 3–6 for a discussion of the dangers of the 'digital divide' as a metaphor.
6. 'The real digital divide', *The Economist*, 10 March 2005, p. 12; V. Vehovar, P. Sicherl, T. Hüsing and V. Dolnicar, 'Methodological challenges of digital divide measurements', *The Information Society*, 22, 2006, p. 280.
7. *The Economist*, *op. cit.*, goes as far as stating that concern that poor countries would not embrace the Internet gave rise to the very notion of a digital divide.
8. Vehovar *et al.*, *op. cit.*; *The Economist*, *op. cit.*, argues that mobile phones offer the best opportunity to close the digital divide that exists.
9. J. van Dijk, *The Network Society*, Sage Publications, London, 1999, p. 155.
10. Organisation for Economic Cooperation and Development, *Understanding the Digital Divide*, OECD, Paris, France, 2001, p. 5.
11. P. DiMaggio, E. Hargitti, W. R. Neuman and J. P. Robinson, 'Social implications of the Internet', *Annual Review of Sociology*, 27, 2001, p. 310.
12. C. Fink and C. J. Kenny, 'W(h)ither the digital divide?', *Info,* 5, 6, 2003, p. 16.
13. *Ibid.*
14. B. Rowe, 'Rural technology deployment and access: successes upon which to build', *Government Information Quarterly*, 20, 2003, p. 87.
15. van Dijk, 1999, 2005, *op. cit.*
16. J. C. Bertot, 'The multiple dimensions of the digital divide: more than the technology "haves" and "have nots"', *Government Information Quarterly*, 20, 2003, p. 186.
17. *Ibid.*, p. 5 identifies five dimensions to the digital divide, namely: technology, telecommunications, economic, information access and information literacy.
18. K. Barzilai-Nahon, 'Gaps and bits: conceptualising measurements for digital divide/s', *The Information Society*, 22, 2006, pp. 269–78.
19. Vehovar *et al.*, *op. cit.*
20. Barzilai-Nahon, *op. cit.*, p. 272.
21. van Dijk, 2005, *op. cit.*; Vehovar *et al.*, *op. cit.*, p. 281.
22. R. E. Rice and J. E. Katz, 'Comparing Internet and mobile phone usage: digital divides of usage, adoption, and dropouts', *Telecommunications Policy*, 27, 2003, pp. 597–623.
23. The first is self-explanatory, whilst the second refers to how experienced the user is with a particular technology. The third focuses on whether use is ongoing or has ceased for whatever reason.
24. For a detailed history of Bhutan see, for example, C. Schickgruber and F. Pommaret, *Bhutan. Mountain Fortress of the Gods*, Serinda Publications, London, 1997.
25. The Royal Advisory Council, consisting of nine members, was established in 1965 to advise the Monarch and government ministers.
26. Royal Government of Bhutan, *Bhutan National Human Development Report 2005: The Challenge of Youth Employment*, Royal Government of Bhutan, Thimphu, Bhutan, 2005a.
27. The degree to which GNH will shape future Bhutanese development is evident in, Planning Commission, *Bhutan 2020: A Vision for Peace, Prosperity and Happiness*, Royal Government of Bhutan, Thimphu, Bhutan, 1999.
28. Royal Government of Bhutan, *Ninth Five-Year Plan of Bhutan*, Royal Government of Bhutan, Thimphu, Bhutan, 2002.
29. One aspect of good governance that has recently been highlighted by the MoIC is information sharing, both within ministries and agencies as well as between the government and the population. The policy is outlined in MoIC, *Policy Guideline on Information Sharing*, Royal Government of Bhutan, Thimphu, Bhutan, September 2006.

30. For a more detailed discussion of the relationship between development and GNH see, for instance, K. Ura and K. Galay, *Gross National Happiness and Development*, The Centre for Bhutan Studies, Thimphu, Bhutan, 2004; or The Centre for Bhutan Studies, *Gross National Happiness*, The Centre for Bhutan Studies, Thimphu, Bhutan, 1999.
31. Planning Commission, *Guidelines for Preparation of the Tenth Plan (2007–2013)*, Royal Government of Bhutan, Thimphu, Bhutan, 2006.
32. See, for instance, Ministry of Information and Communications, *Information and Communications Tenth Five Year Plan (2008–2013)*, Royal Government of Bhutan, Thimphu, Bhutan, October 2006. In some respects the underpinning role of ICT in development in general and the tenth five-year plan in particular is unsurprising given earlier attempts at developing an integrated, multi-stakeholder, strategy. One such attempt that demonstrates the diversity of interested parties is, Royal Government of Bhutan, *Bhutan Information and Communications Technology and Strategies (BIPS) Final Report*, Royal Government of Bhutan, Thimphu, Bhutan, July 2004.
33. ICT is also seen as being able to play a role in good governance, a role that has been clearly articulated in: Royal Government of Bhutan, *Good Governance Plus—In Pursuit of Gross National Happiness*, Royal Government of Bhutan, Thimphu, Bhutan, 2005b. Good governance more generally is discussed in, Royal Government of Bhutan, *Enhancing Good Governance for Gross National Happiness: Promoting Efficiency, Transparency and Accountability*, Royal Government of Bhutan, Thimphu, Bhutan, 1999.
34. Bhutan Telecom Authority, *Bhutan Telecommunications Act 1999*, Thimphu, Bhutan, 1999.
35. Details of the location and cost of interconnection can be found in Bhutan InfoComm & Media Authority, *Reference Interconnection Offer of Bhutan Telecom Limited*, Thimphu, Bhutan, 2006a.
36. Bhutan InfoComm & Media Authority, *Invitation for Expression of Interest for Mobile Cellular Telecom License*, Thimphu, Bhutan, 2006c.
37. Bhutan InfoComm & Media Authority, *Mobile Cellular Telecom Licence*, Thimphu, Bhutan, 2006b; Bhutan InfoComm & Media Authority, *Information Memorandum—Mobile Cellular Telecom Licence*, Thimphu, Bhutan, 2006d.
38. BICMA, 2006b, *op. cit.*
39. BICMA, 2006d, *op. cit.*
40. Kezang and J. Whalley, 'Telecommunications in the land of the thunder dragon: recent developments in Bhutan', *Telecommunications Policy*, 28, 2004, p. 794.
41. *Ibid.*, p. 796.
42. Bhutan's road infrastructure has improved. Not only have hardened roads been built, but accessibility over numerous mountain passes improved as well. However, the mountainous terrain means that routes are often circuitous and suitable for just a single vehicle at a time.
43. The road, however, is not yet complete with the consequence that it is still easier to travel north/south than east/west.
44. Royal Government of Bhutan, 2002, *op. cit.*, p. 50.
45. *Ibid.*, p. 52.
46. According to Danida, *Strategy for Danish Development Co-operation with Bhutan 2003–2007*, Danida, Copenhagen, Denmark, 2003, p. 9, major donors included the Asian Development Bank, Austria, Denmark, the Netherlands, India, Japan, Switzerland, the UN and the World Bank.
47. An overview of the media sector in Bhutan can be found in S. S. Pek, *Media Impact Study 2003, Report Prepared for The Ministry of Information and Communications*, MediaCom Consultants, Thimphu, Bhutan, 2003, where numerous examples of private sector participations are noted.
48. The government moved several senior managers into new posts. The managing director of Bhutan Telecom was moved to the national airline, whilst the BCA director moved to Bhutan Telecom where he had previously worked. A new director general was appointed for BICMA/BCA in March 2006.
49. It is worth noting that the government has signalled its intentions to scale back the state sector and encourage private sector activity.

50. Pek, *op. cit.*
51. *Ibid.*, p. 18.
52. Interestingly when BBS sought local content production it failed to attract any interest among Bhutanese production companies.
53. The remaining six hours are equally divided between English, an eastern language and Lhotshamkha, a language spoken in southern Bhutan.
54. It is, however, repeated the following morning so programming is available 10 hours per day.
55. Pek, *op. cit.*, p. 20.
56. *Ibid.*, p. 21.
57. In May 2002, BCA stated that packages should contain at least three entertainment channels, two sports channels, two news channels and one local origination channel. Whilst some cable-TV operators opted to re-broadcast BBS, others have broadcast a range of content that sometimes is not local in origin. Although this does question the extent to which local origin rules are being adhered to, this does not appear to have resulted in any regulatory intervention to rectify the matter.
58. See, for instance, C. Scott-Clark and A. Levy, 'Fast forward into trouble', *The Guardian*, 14 June 2003, pp. 14–20 ; and 'The pursuit of happiness', *The Economist*, 18 December 2003, pp. 117–9.
59. T. C. Tobgyl, *Wireless IP Based Rural Access Pilot Project*, ITU, Geneva, 2004, available online at: www.itu.int, accessed 16 November 2004. It is worth noting that this is likely to increase once the full impact of the Danish funded rural telecommunications project is felt.
60. See, for instance, Royal Government of Bhutan, 2002, *op. cit.*, or Ministry of Information & Communications, *Project Proposal for Establishing Information and Communications Technology (ICT) Infrastructure for Rural Communities and Schools in Bhutan*, Ministry of Information & Communications, Royal Government of Bhutan, Thimphu, Bhutan, January 2004.
61. Ministry of Information & Communications, 2004, *op. cit.*
62. The direct beneficiaries of the proposed project are 20 schools located in 13 Dzongkhags. Of these, most have access to electricity and/or electricity with the consequence that most of the capital expenditure is targeted towards buying computers and printers on the one hand and the necessary networking infrastructure on the other hand.
63. Whilst basic health units can be found across the country, there are only 109 doctors and 29 hospitals in Bhutan (Royal Government of Bhutan, 2002, *op. cit.*, p. 76).
64. The two hospitals linked together were Monggar Regional and Jigme Dorji Wangchuck National Referral Hospitals (Royal Government of Bhutan, 2002, *op. cit.*, p. 77).
65. According to the final report of the BIPS working group, by 2006 citizen participation in government will be improved by ICT and by 2010 the quality of services delivered will be improved (Royal Government of Bhutan, 2004, *op. cit.*).
66. The user would need search skills to find the services, as well as technical skills (downloading files etc.) as well as word processing skills (to complete the form).