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Computing at the Top of the World

Nepal must mend the wide digital divide it has with most countries. But more importantly, can it close this divide among its own people?

Starting near sea level in the tropical jungles along its southern border with India and moving northward, Nepal rises steeply to almost 30,000 feet in the Himalayas and contains eight of the 10 tallest mountains in the world, including Mt. Everest (Saragmatha). Beyond these it is downhill to the 15,000-foot Tibetan Plateau and the other Asian giant, China.

Although Nepal's landlocked position at the top of the world helped protect it from some of the worst impositions by foreigners elsewhere in Asia (but has not spared it from the troubles of others, as exemplified by refugee migrations from Tibet and Bhutan), isolation has deemed Nepal a Least Developed Country (LDC), as classified by the United Nations Development Program (UNDP). In the late 1990s, Nepal's per capita GNP was U.S.$210; of the country's roughly 21 million people, 80% were engaged in agriculture; 42% of the population was under 15 years of age. Only 39% of the population is literate, with large variations according to gender, region, and ethnic community. In what is potentially the "Saudi Arabia of hydroelectric power," only 15% of Nepali households have electricity.

Nepal is a parliamentary democracy under a constitutional monarchy (that for a short time had the peculiar distinction of electing a Marxist-Leninist government). Some Maoist guerrilla activities and domestic police excesses aside, Nepal has been spared the massive internal bloodshed that too often characterizes other LDCs with internal ethnic divisions. It is not seriously threatened by its giant neighbors. Not many LDCs have a long history of such stability.

Nepal is one of many historically poor and geographically isolated countries now looking to

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information technology (IT) to help relieve these problems by providing socially and economically valuable connectivity to other parts of the world. Is some sort of closing of the international digital divide possible, or realistic, for such a country?

Telecommunications

Not surprisingly, Nepal is a late-comer to telecommunications.[1] One phone line between the capital at Kathmandu and the Indian border was opened in 1914, but it was not until 1955 that the local exchange in Kathmandu numbered 300 lines. Telex service started in 1972. The first satellite earth station was installed in 1982; prior to that, most international traffic, and much of domestic long-distance traffic, was conducted via short-wave radio because of the high costs of overcoming the country's extreme geographical landscape.

Telecommunications growth began to pick up in 1970 with the government's First Telecommunications Project. The 5,350 lines at that time increased to 82,774 by 1995 (see [3] for the sources of the statistics used here). Since then, World Bank loans and the attendant introduction of transparent international tendering

have helped push the rate of growth of telephony in Nepal as high as that of any country in South Asia. By the end of 1999, teledensity had reached a milestone of 1.0—one line for every 100 people—with about 250,000 lines and another quarter million potential subscribers on a multi-year waiting list. But distribution is uneven. Approximately two-thirds of the telephones are in the capital region, where less than 4% of the population lives. The 18.2 teledensity near Kathmandu should be compared with 1.07 for the country as a whole, and 0.06 in the rural areas. As of November 1999, 12 of the country's 75 districts had no direct service; only 1,535 of the 3,996 Village Development Councils (VDCs) had telephone access, and there were a mere 3,154 mobile subscribers.

Telecommunications remains largely a government-regulated monopoly, and the country suffers accordingly as is often the case in LDCs. Labor productivity of the employee-bloated National Telecommunications Corporation (NTC) is about 40% of the global average, and the provision of affordable wireless mobile service is minimal at best. Such monopolies are often justified by arguments that only the state can look out for the communications needs of the poor and rural populations. Clearly the NTC has not delivered much in this regard.

Almost 60% of the NTC's revenue comes from international phone calls. Much of this is from the U.S., with whom Nepal has a 9-to-1 ratio of incoming to outgoing traffic. This pattern is consistent with that of many other

LDCs, for example, India (11-to-1) and Vietnam (40-to-1), since the U.S. is the home of large and relatively wealthy diaspora communities and the locus of the major call-back service providers.

Some privatization and liberalization is in the offing. Much of the latter is in the form of licensing private VSAT providers and users, with about a dozen such licenses granted by mid-January 2000. Prospectively, some mobile phone service will be privately licensed.

Computing

There are an estimated 80,000 computers in Nepal. This inventory grew by 10,000–15,000 in 1999. About 100 companies sell computer equipment in the country, including one that specializes in Apple products (they even had a G4 available in January 2000). All hardware is imported, including brand machines (Dell, Compaq); unbranded parts are assembled in-country. About 75% of the inventory falls into the latter category. This places PC penetration at about 0.27 per 100 inhabitants, slightly lower than India and Pakistan, but higher than Bangladesh.

The software market largely consists of branded shrink-wrapped packages. Software piracy is very high. There may be about 25 companies developing software, with a very small number involved in export work for foreign companies. One obvious area of local work is in software using the Nepalese language. Unlike other one-country languages (for example, Vietnamese), Nepali suffers from not being universally

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[1]Remarkably, what may have been the first military use of the telephone occurred on the northwest frontier of the British Indian Raj during the campaign against the Jowaki tribe, 1877–1978. A detachment of the 4th Company Bengal Sappers and Miners used a "receiving and sending set" ... "made from wood and zinc by Captain J.W. Savage, RE [Royal Engineers], probably from a description in the *Scientific American* by Graham Bell, and we used it between Peshewar and Shergasha prior to the campaign and afterwards. I regard this as the first case of the use of such apparatus in war. Whether the line went into Jowaki territory or not I do not know." This use of the telephone in a war zone in what is still one of the most isolated parts of the world occurred within a year or two of its invention. [1]

Unlike other one-country languages, Nepali suffers from not being universally spoken even in its home country.

spoken even in its home country, and from the fact that literacy is so low.

Computing is almost nonexistent in the great majority of educational institutions. This is true even at the university level. Tribhuvan University is by far the largest tertiary educational entity in Nepal. It is an extensive national system with 61 constituent and 157 private affiliated campuses around the country. About 150,000 students are enrolled. Yet a total of only about 100 degrees in computer science, computer engineering, or MIS are awarded each year in Bachelor's or Master's programs. Students and faculties in other disciplines often have no access to computing. As is the case in many LDCs, something of a cottage industry in private training schools has rapidly developed. These provide most of the country's schooling in computing, but almost all of it is at the precollege or vocational level, and much of it trains people to use software packages.

The Internet

It should be no surprise that Nepal was a latecomer to the Internet. UUCP dial-up email service first appeared in 1994, but it was not until 1999 that a change in government telecommunications regulations permitted privately licensed VSAT connections. This change permitted affordable Internet service, resulting in a modest take-off. By January 2000 there were nine operational licensed ISPs servicing 9,000 accounts with perhaps 35,000 users. (In most LDCs, the average number of users per account is at least 3-to-1.)

The user community is heavily concentrated in the Kathmandu area. This is in keeping with its infrastructure—the presence of electric power, telephones, and literacy. It is consistent with the concentration of resident foreigners, for whom the Internet has become an affordable lifeline to family, friends, and business associates abroad. It has also become an affordable lifeline to and from Nepalese living abroad, who have generally left the country for education or employment. WorldLink, the Nepalese ISP with the most subscribers, estimates that 40% of their accounts were only UUCP.

No sector—government, business, education, or health—enjoys any extensive penetration of the Internet. Of all these sectors, probably business and personal use is showing the most vitality. There are several hundred ".np" domain names—including a good number of Japanese sites possibly because .np is a nifty abbreviation for "Nippon"—and perhaps almost as many using other top-level domain names, mostly ".com." Web pages are largely static, and e-commerce minimal. The most successful parts of the economy—tourism, carpets, gar-

ments, some value-added agricultural products—are often characterized by high transaction costs and foreign middlemen. One would think that e-commerce has the potential to relieve both problems. However, Nepal would have trouble providing the physical infrastructure for such things as timely delivery and presently lacks support for online credit card payments.

Problems and Prospects

Clearly, Nepal is far from the leading edge of nations pursuing information societies. However, given the overall state and history of the country, in some ways it is remarkable it has as much IT as it does. As is the case with many other LDCs, parts of the business and government sectors see both needs and opportunities with regard to IT. New technologies, dramatically reduced costs, more diversified forms of availability, and especially a perception that the benefits of IT may not just be limited to advanced economies, have put these technologies within reach of significant portions of the populations of even very poor countries. (For a more extensive discussion of the possibilities, see [2]). In Nepal's case, technologies such as satellite links, Internet, GPS, and wireless telephony are now inexpensive enough and readily available through a large number of commercial and other sources that much can be done to affordably overcome the extreme problems of topography and location at the top of the world.

So now what? There are both commercial and government advocates for the greater absorp-

tion of IT into the Nepalese economy and society. The government, led by the National Planning Commission and the Ministry of Science and Technology, is looking to create a realistic National Plan to this end.

But Nepal's government simply does not have a good record of directly providing IT—in any form, including telecommunications, computing, the Internet, or even the mass media—to the population. The best it has been able to do is the straightforward increase in telephony, largely financed by international aid, and carried out via the state monopoly. But, as we have seen, even that barely gets the country a teledensity of 1.0, and only 0.06 in the rural areas. The government does not seem to have the will, the know-how, the people, or the financial resources to directly live up to its recently proclaimed desires to bring the benefits of widespread modern IT to the country. Far more attention is given to traditional areas like agriculture, and one of the stated constraints on any national IT plan is that it must not cost much hard currency (the Nepalese rupee is not a convertible currency). There are some modest success areas—civil aviation, parts of the tourist industry, the little explosion of ISPs and Internet users—but these have come about largely because the government got out of the way and opened the field for some small, more energetic, private enterprises.

Perhaps the government might best pursue an enabling strategy? It needs to get over the mindset of trying to squeeze every dollar of hard currency from every place

it can impose a tariff or tax, and get beyond bureaucratic protectionism for inefficient pieces of government, including the NTC. Some progress has been made at least in the former regard, but it would be helpful if IT-related activities were given enough of a break so they could be made reasonably affordable to a greatly expanded potential set of users. In the long run, this may help to positively leverage the economy and quality of life more broadly than can be done with a few more dollars in the hands of the government.

In this vein, a more aggressive policy of encouraging competition may pay off. Perhaps the most important way to do this would be for the government to tender for a full-service competitor for the NTC. This tender could itself be an important policy instrument in that it might include conditions successful bidders would have to meet, such as the provision of services to the country's remote areas. Given the realities of finances and technological capabilities in Nepal, this would almost certainly require some serious foreign investment and management help, and both should be welcomed.

Arguably one of the best ways to leverage local currency is through investment in people in the educational sector. Here the government could create incentives such as salary differentials for junior faculty and student scholarships in disciplines like engineering and MIS. Furthermore, it is important to bring the Internet to at least the universities. Much of this can also be done with rupees. People at the Institute of Engineering at Tribhuvan, at the com-

panies of the Computer Association of Nepal, and members of the Nepal Internet Users Group can make this happen on a fairly extensive basis and at modest costs. This can create an expanded and productive user community over the long term. In time, the more productive and internationally competitive parts of the Nepalese economy will hopefully be major beneficiaries.

One plus is Nepal's entrepreneurial side. Its ISP community has been driven by smart, young business people, many educated abroad. Another example of the country's grass-roots dynamism is the HealthNet project. This provides around 500 medical professionals in the country with Internet access. Yet another example of local involvement are the dozens of shops in Kathmandu providing everything from photocopying to international phone calls and email access. It is likely that there are such entrepreneurs located outside the capital willing to start similar businesses if they had access to an inexpensive telecom infrastructure. These success stories need to be nurtured and expanded to make IT sustainable in Nepal.

Can a country like Nepal close the wide digital divides it has both with most of the other countries in the world, and among its own people? Put this way, the question is not a fair one. Nepal simply does not have anything like the favorable factors and the potential to become another world-class IT success story such as Taiwan. The real question is whether a remote country with a 39% literacy rate in a language among those least favored in cyberspace, and with

fundamental shortcomings in related infrastructure such as electric power, can benefit from the global spread of IT much beyond perhaps 100,000 relatively well-off people among a population of approximately 21 million. We believe it is possible but in a different way than has happened in advanced economies. The vast majority of Nepal's inhabitants do not have the income or awareness for individual access. Therefore the solution is mass access through public locations where training and assistance can be provided. A necessary condition for this to happen is for the government to have the will to make it happen, even if that means recognizing it has to adjust some of its privileged positions in the process. **c**

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