Cambodia

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.kh

Overview

The 1991 Paris Peace Accords initiated the present socio-political organisation of Cambodia after more then 20 years of civil war and internationally imposed isolation. The subsequent 18 months under the United Nations Transitional Authority for Cambodia were not sufficient to bring to an end the military conflict in the country. However, national elections in 1993, which brought the re-establishment of the Kingdom of Cambodia, marked also the beginning of multifaceted international efforts – by multilateral agencies, governments and NGOs – to reconstitute the economic fabric of the country.

As far as IT is concerned, a 2001 ITU study on Cambodia provides the general picture: "It has the dubious distinction of having the lowest Internet penetration in South East Asia as well as the highest prices."[1]

Telecommunications of all kinds have been scarce until recent years. In 1990, Telstra of Australia provided the first 300, then 600, then 1,200 telephone lines via satellite, an alternative to the manually switched international connections to the InterSputnik system and an alternative to the expensive INMARSAT system of the government, which had been made available also for fax transmissions by NGOs. However, telephone access remained limited as not even all sectors of the capital city had wired telephone lines available, and the lines that did exist were noisy and broke down frequently.

Considering this background, the development of the national ICT infrastructure has been tremendous. The great leap became possible through wireless systems, first through the widely established non-mobile wireless Thai Shinawatra system, and then through the introduction of mobile phones. Since 1997, the number of wireless phones has outnumbered wired phones.[2] In 2001, Cambodia had 31,000 wired phones and 250,000 mobile phones, a ratio of about 1:8 – the "world's highest mobile share".[3]

Technical availability and economic availability are, however, two quite different realities. With a monthly salary of around US$30 for high school teachers, ICTs stay for many outside of their financial possibilities. Though the website of one ISP shows the honour students of seven high schools in Phnom Penh, none of those schools have Internet access.[4] Furthermore, the economic gap between the urban and the rural population is strongly reflected in the gap in telephone lines and Internet access.

There is no local open source movement, though the issue is recognised at some levels. Linux network servers have been in use in Cambodia since 1996. The challenge "to avoid dependency on proprietary systems, instead promoting open systems and interoperability" was mentioned in the closing remark of Senior Minister Sok An at the IT Awareness Seminar convened by the National Information Technology Development Authority in September 2001.[5] Periodic crackdowns on CD pirates – vendors and factories – have shown the public that piracy is an emerging problem,[6] although the implications are not yet widely grasped.

It is not only economic reasons and the preexisting communications infrastructure that have hampered the development of ICTs in Cambodia; the script of the national language – Khmer – has posed an additional impediment.

A visiting delegation from the Center for the International Cooperation for Computerization[7] of Japan remarked, back in 1999, that the major buyers of computers in the country are foreign companies and NGOs.[8] Although there are no official statistics on this, it appears that the next biggest group of buyers is the Cambodian business sector, government institutions and UN-related agencies.

As private computer ownership is limited for economic reasons, public access points – Internet cafés – play an important role, though they are confined mainly to the capital city of Phnom Penh and to Siem Reap, the town nearest to the ruins of Angkor Wat and thus a destination for most foreign tourists. A study in 2001 identified about 100 Internet cafes in Phnom Penh,[9] while one Internet access point each in the provincial capitals of Pursat and Kompong Thom was reported in the press.

Internet cafés are frequented not only by foreign tourists, but also by many Cambodian students, male and female. As there are not many systems available that can handle Khmer fonts, a certain level of knowledge in the English language is a prerequisite for accessing the Internet. Two Cambodian youth and student organisations[10] were among the earliest users of e-mail systems in Cambodia in 1995.

Content

As a consequence of the lack of standardisation of the Khmer script on computers, content production was restricted during the initial years to content in foreign languages – mainly English and some French. This relates first of all to e-mail. Only in early 2000 did the Open Forum of Cambodia,[11] a Cambodian NGO which is committed to facilitating and fostering communication in Cambodian society, actively promote a free software package which allows writing e-mail directly in Khmer. To do this, it created the first HTML website in Khmer with an automatic font download and offered to share this technology with others.

The general portal of Everyday.com.kh, operated by the mobile phone company and wireless broadband provider Mobitel/Telesurf, was the first full-fledged bilingual portal to also offer e-mail in Khmer. The company uses an unconventional technology to run their "e-mail" service. It operates more like Internet greeting cards, where users receive an e-mail message with the URL of a special webpage where messages addressed to them are available for download. The e-mail is not automatically delivered to recipients' computers.

The vast majority of Cambodia-related websites are in English, even when published and hosted in Cambodia. Unfortunately, there is also a tendency to produce Khmer content from scanned text in the form of huge graphic files, which are not only slow to download but can also be expensive, depending on the telephone system and the ISP plan used.

There is also Cambodia-related content in French and some other languages. A remarkable example of this is the website of the Japanese Embassy in Phnom Penh,[12] which is in Japanese and English. A plan to add a Khmer version is under discussion; the choice among the different Khmer font options seems to delay its implementation.

The content of websites comprises largely of information and reports by UN agencies, NGOs and Cambodian government agencies. Commercial sector website content is dominated by tourism-related information.

A new element is the introduction of mailing lists by the Open Forum of Cambodia. These are in both English and Khmer and relate to life in Cambodia in general, the political elections, women's issues, discussions about reportage in the Cambodian press, trafficking of women and children, etc.

There are not many websites with a specific educational content, and hardly any in the Khmer language. Of the few educational websites, one of the best and oldest in Cambodia is the University of Tropical Agriculture website, which had its beginnings in a mailing list.[13] It has information not only about an ecological farm operating in Cambodia and related procedures and technologies, but also links to similar institutions in Colombia and Venezuela (they all originated from a common international effort in 1993). The Cambodia-

Cambodia facts

Total population: 12.3 million (2001)[a]

Rural population as a percentage of total population: 82.6% (2001)[a]

Key economic sectors: Agriculture, garments, tourism.

Literacy in the national language(s): 68.5% (aged 15 and over)[a]

Computer ownership per 100 inhabitants: 0.11 (2000)[a]

Telephone lines per 100 inhabitants: 0.27[b]

Internet cafés/telecentres per 10,000 inhabitants: 0.08 (2002)[c]

Internet users per 100 inhabitants: 0.05[d]

Cell phone subscribers per 100 inhabitants: 2[e]

Number of websites in the national language(s): A search for the ".kh" domain on the Google returned 9,020 hits. The vast majority is, however, not in the Khmer language.

Number of websites in English and other languages: The Cambodia Webring claims 1,921 users, but not all have a website, and the majority are not registered under ".kh".[f]

National bandwidth within the country: No Internet backbone in Cambodia.

National bandwidth to and from the country: 6 Mbps and 3.5 Mbps (2001)[e]

Sources:

(a) <http://www.worldbank.org/cgi-bin sendoff.cgi?page=%2Fdata%2Fcountrydata%2Fict%2Fkhm_ict.pdf>.

(b) World Bank. *Cambodia: Final Report* David Butcher & Associates <http://www.dba.org.nz/PDFs/Cambodia%20Final%20Report.pdf>, p. 4.

(c) See note 9. Estimated number of Internet cafés in Cambodia is about 100.

(d) This is a very vague guess – the number of Internet accounts may be more than double – not including web-based accounts at Yahoo, etc.

(e) <http://www.itu.int/ITU-D/ict/cs/cambodia/index.html>. p. 5, for 2000; later figures estimated.

(f) <http://www.camweb.org/modules.php?op=modload&name=Members_List&file=index> 10 October 2002.

related section of this website is prepared in Cambodia and about work in the country. All the material is posted in English.

One portal[14] offers its content in English, French, Spanish and Khmer – but not everything is published in all the four languages. There are quite a number of broken links at this site. The Department of Meteorology website offers its content in Khmer, English and Japanese.[15] The Mekong Project Development Facility – as a regional effort – offers English, Khmer, Lao and Vietnamese versions of its content.[16] The Khmer page is a combination of scanned Khmer text, in GIF format and what appears as unintelligible extended ASCII characters as there is no facility built into the website for downloading the necessary fonts to correctly display the Khmer script when choosing this link.[17]

It is now a challenge to access the different websites around the world offering content in the Khmer language as they have adopted many different Khmer font systems. Examples of such websites include the Khmer language training programmes at the Northern Illinois University and the Cambodia portal website hosted in Phnom Penh.[18] This challenge will be overcome once the Unicode system is made widely available and these websites are updated to adopt the new, commonly accessible system.

Important national sources of content

Some of the popular or important sources of content and information are shown below. Some are not strictly "indigenous" but were produced by Cambodians living abroad or by non-Cambodians working on activities related to Cambodia.

<http://www.everyday.com.kh>
One of the most widely used portals with news, webmail, and chat. It is run by Telesurf, the biggest broadband provider – general web and dial-up access with prepaid cards. Free e-mail accounts are provided to users of mobile phone connected to Mobitel. The languages used are Khmer and English.

<http://www.cambodia.org>
This US-based Cambodia portal provides many links to a wide variety of institutions and information. It offers its proprietary Khmer font system for download. The language used is English.

Cambodia Daily **<http://www.cambodiadaily.com>**
This is published by the English language *Cambodia Daily* newspaper. It includes an index starting in 1998, an important tool for research. This site is in English.

NGO Forum on Cambodia <http://www.ngoforum.org.kh>
This website offers important documentation on social and political affairs. It is in English.

<http://www.cambodian-parliament.org>
This is the site of the National Assembly with links to its membership and the Constitution. It included in October 2002 a drop-down menu with an "appeal to the international community for assisting the Cambodian People in this severe food shortage" by Prince Ranariddh, president of the National Assembly. Note that this site is not registered under the ".kh" country domain. The languages used are Khmer and English. The Khmer page loads very slowly because it uses a graphical display of the Khmer language.

<http://khmersenate.org>
This is similar to the site of the National Assembly. This site is also not registered under the ".kh" domain. It uses Khmer and English. The Khmer page displays ASCII equivalents of the Khmer font, unless special fonts are loaded first.

Documentation Center on Cambodia <http://welcome.to/dccam>
This centre is developed from Yale University's Genocide Documentation Project. The site uses Khmer and English with Khmer in huge GIF files, which load slowly.

United Nations <http://www.un.org.kh>
This site contains documentation and links to all 12 UN agencies working in Cambodia. It uses English.

National Institute of Statistics <http://www.nis.gov.kh>
This website offers information on statistics law and survey results in English.

Ministry of Information's National Committee on Culture and Information <http://www.moi-coci.gov.kh/index.htm>
This website is in English.

Institut de Technologie du Cambodge <http://www.kh.refer.org/itc>
This institute is the major academic, technological and educational institution in Cambodia. Its website uses French.

<http://www.kh.refer.org>
This is the site of the Cambodia contact of Agence Universitaire de la Francophonie which connects research activities in 23 member countries of the Francophonie. The language used is French.

<http://www.cambodiaportal.com>
The most multifaceted portal, it has links to news, education and business. It is in Khmer, English, French and Spanish.

Encoding the Khmer script

A DOS-based word processor – "Khmer in Office" – was the first widely used program that allowed the Khmer script to be used on a computer. The advent of MS Windows led to many different and mutually non-compatible font families to be created. Many of these fonts were developed by Cambodians living abroad. In 2001, a program to convert between some of these different fonts was released. It can handle 23 different font families.[a]

Attempts made to establish a common encoding standard in Unicode ran into many challenges. The Unicode Consortium had adopted a system without the participation of Cambodia. It was only after the Royal Academy of Cambodia and the National Information Technology Development Authority of the government had appealed in 2001 for fundamental changes did the president of the Unicode Consortium concede in April 2002 that the "encoding approach taken . . . is not the preferred approach of the Cambodian National Body or of the Khmer linguistic experts, and is at odds with the way the Khmer script is perceived and taught in Cambodia. A number of characters were added which now appear to have been clear mistakes. A number of symbols and other characters used in the representation of the Khmer script were overlooked in the encoding. The Unicode Consortium acknowledges and regrets that over the last several years, insufficient efforts were made to maintain full communication and consultation with all interested parties in Cambodia. This has resulted in the current unfortunate situation where all interested parties now have to deal with a less-than-optimal outcome with respect to the Khmer encoding. The Unicode Consortium sincerely regrets the impact that this may have. The Unicode Consortium has taken a number of steps to provide for the best rectification feasible for the mistakes that have been made In the Khmer script encoding."[b] Amendments have been made to Unicode version 3.2.[c]

The struggle to get the cultural traditions of the Khmer script respected revealed that other language communities are encountering similar problems. The Cambodian example should lead to more sensitivity on the part of international standards bodies like Unicode and ISO.

a TeukTrey for Windows, provided by the Open Forum of Cambodia, available at <http://www.forum.org.kh/eng/download.htm>.

b Letter to the Undersecretary of State, Dr Pan Sorasak, coordinator of the Cambodia National Body for the standardisation of the Khmer script on computers, 25 April 2002.

c Unicode 3.2, IV Block Descriptions, 9.15 Khmer (addition) <http://www.unicode.org/unicode/reports/tr28/>

<http://www.camnet.com.kh/cambodiaschools>
This is the website of a fund-raising project for rural schools in Cambodia. It is in Khmer and Japanese.

<http://www.bigpond.com.kh/users/eojc>
The website of the Japanese Embassy in Phnom Penh is both informative and communicative. Letters from the ambassador on his visits and meetings in the country are available here. The site uses Japanese and English (Khmer version being prepared).

<http://www.cambodia-hotel-reservations.com>
<http://www.star-tour.com/hotels/hotels.shtml>
These are two examples of the most frequently accessed type of Cambodia-related commercial webpages, which also provide general tourist information. They are in English.

Open Forum of Cambodia <http://www.forum.org.kh>
This was the first webpage in Khmer HTML (the font is loaded automatically to the computers of visitors). It promotes the use of the Khmer language in computer communication (e-mail, mailing lists, software and technical information are available at the website). This NGO also publishes weekly reviews of the Khmer language press in both Khmer and English.

Online services

Two ISPs provide online and time-charged dial-up services using prepaid cards at their portals. The first is Bigpond (set up by Telstra of Australia in 1997 and bought over in mid-2002 by the Cambodian company Cogetel – it is now changing its name to Online). The second is broadband provider Telesurf.

There are no specialised online services in education, commerce or telemedicine in operation. There are extensive plans for e-government (in cooperation with a South Korean company) under preparation, but details are not available.

The chatrooms offered at Bigpond and Telesurf's Everyday are at present not active enough to be called e-communities or e-forums.

There is, however, text-based service which has been growing steadily since its inception by the Open Forum of Cambodia. It operates via mailing lists, in English and/or Khmer. There are two dozen such lists, among them are:

- AIDS
- Committee for Free and Fair Elections
- Decentralising Administration (ViMacheka)
- Discussing the Press (Kanychok Sangkum and Mirror)
- Internet Concerns
- Khmer Talk
- National Elections 2003
- No Trafficking of Women and Children!
- Women Speak (NieryNiyeay)

ICT industries and services

Hardware

The first computer shop was set up in 1992, at a time when even standard equipment such as modems was not stocked by local retailers and had to be specially ordered from Singapore. By now, several dozen shops sell computers, many of them clones assembled in Cambodia. The proximity of Malaysia and Singapore allows for an easy and steady flow of the latest hardware parts. However, faulty notebooks still need to be sent to Singapore for repairs – a time-consuming process.

Software

Clone computers assembled in Cambodia are mostly equipped with Windows-based software. Most of the latest software is available at US$2 per CD in several markets and shops.

The first indigenously developed software in the pre-Windows time was a DOS-based Khmer package "Khmer in Office", which quickly disappeared when Windows 3.1 became the dominant software.

The introduction of Windows triggered the development of many different Khmer font families by expatriate Cambodian communities in the USA, France, etc., and also inside Cambodia. They are all mutually not compatible.

The Open Forum of Cambodia provided in early 2001 a free-of-charge font conversion program – TeukTrey – which can handle 23 different font families and convert them to the Word file format, the de facto standard in Cambodia for text files.

There is an effort, underway for almost the past decade, to create a unified system in Cambodia through Unicode. However, there were fundamental differences in the understanding of the structure of the Khmer writing system between the foreign designers of the Khmer coding at Unicode and the Cambodian National Body charged under the National Information Technology Development Authority (NiDA).[19] These differences were resolved only in 2002, via a cumbersome process.[20]

Services

There are about 100 Internet cafés in Phnom Penh[21] and a small number in the other tourist centres: Siem Reap (near Angkor Wat) and the port city of Sihanoukville. Most of these offer not only web and e-mail access, but also VOIP at very low costs. Although VOIP was declared illegal by the Ministry of Posts and Telecommunications (MPTC) on 30 December 1998,[22] so far it is not being consistently suppressed. The high cost of telecommunications in Cambodia is also criticised by part of the political leadership, such as Prince Ranariddh.[23]

Examples of innovative and key initiatives

Maybe the most innovative aspect to be mentioned here is that Cambodia – after decades of internal war and externally imposed embargoes – began to have access to the Internet in 1994 through e-mail and in 1997 to the World Wide Web. However, the precarious economic condition of the country, including the low levels of financial resources in the education sector (a high school teacher is paid a monthly salary of about US$35), has kept this window to the world closed to most of society.

NGOs have widely pioneered the provision and the use of this medium of communication in their work towards a more humane society. NGOs and UN-related agencies, as well as the government, are using this medium to share information. A pioneer in this field is the NGO Forum on Cambodia.[24]

The gradual use of mailing lists to address social concerns is a new approach towards deploying the Internet for social action.

Special mention ought to be made of the 400,000 Cambodians living abroad. They had left to avoid the violent conflicts in the country which lasted from about 1970 to 1992. The use of the Internet by these expatriate Cambodians needs to be noted. One example, among many, is the KhmerConnection in Long Beach, California, USA,[25] who state their goal as "bringing about positive change in the Cambodian community. We saw disjointed efforts by various parties to create Cambodian websites to serve the Cambodian people, but we felt that they all lacked in one quality, communication. The Internet has been realised as a lightning-quick medium to spread information, but Cambodians have not put this power into use yet. Our goal is to use the Internet to empower Cambodians with words, opinion, and imagination."

Enabling policies

"Despite this low teledensity and the large disparity between Phnom Penh and the provinces, there is no formal government policy for universal telephone access in Cambodia."[26] Unfortunately, this statement in the ITU research report about the telephone sector in Cambodia is also true for virtually all aspects of the Internet sector.

The Prime Minister's opening speech at the 2001 Information on the IT Awareness Seminar[27] revealed a clear awareness of the need for an energetic development of this sector. However, there is little evidence to date that this sector is receiving compatible policy attention in the various ministries concerned. A US$20 million plan for the introduction of e-government may bring change. Details were not yet available to the public as of late 2002.

NiDA is supposed to be the coordinating body <http://www.nida.gov.kh>. It is part of the Office of the Council of Ministers. Its websites include <http://www.ocm. gov.kh>, <http://www.cambodia.gov.kh> and<http://www. camnet.com.kh/ocm/government.htm>.

Regulatory environment

During the IT Awareness Seminar held in 2001, the Prime Minister clarified the purpose of creating NiDA: the "Authority was established to consider the benefits and implications of IT use and to study and establish appropriate institutional organisations to meet Cambodia's current conditions. Its objectives also include human resource training, introduction of international standards and the establishment of a sound legal and regulatory framework."[28]

The operation of MPTC is based on a royal decree dated 24 January 1996, the *Law on the Establishment of the Ministry of Posts and Telecommunications*, and a subdecree dated 22 October 1997 on the organisation and conduct of the ministry.

The above case also reflects the situation in the other sectors, where harmonising and updating of legislation have not been completed after the creation of the Kingdom of Cambodia in 1993. In some cases, legislation from the pre-1970 situation is still applied. In yet other cases, what was promulgated during the 18 months of the United Nations Transitional Authority for Cambodia in 1992/93 remains in force. The National Assembly meanwhile is refining legislation passed recently.

This complex situation has led to many issues being resolved via ministerial decisions. For example, approval for the Open Forum of Cambodia to set up the first dial-up connection to the Internet in 1994 was given in the form of ministerial letters from MPTC. Restrictions disallowing the Open Forum from providing web access were also announced later in ministerial letters without reference to legislation. Similarly, regulations for the administration of the ".kh" country domain have changed repeatedly without clear explanations. The changes are not based on general IANA/ICANN framework regulations.[29]

The most visible non-enforcement of a regulation is the prohibition of VOIP which is publicly available at numerous places in Phnom Penh in spite of its prohibition being published repeatedly.[30]

MPTC is the main regulatory body. Its website <http://www.mptc.gov.kh> gives information on some of its activities and telephone and fax numbers for contact, but no e-mail addresses.

The domain name system administration can be contacted at <dns-admin@dns.net.kh>. MPTC's regulations may be obtained from <http://www.mptc. gov.kh> under "Regulations". The page "Regulations – E-Commerce Draft Regulation" carries an undated draft regulation for e-commerce but without explanatory notes.

There have been some cases of cyber crime, mostly involving stolen dial-up passwords. A high-profile case concerned the invoicing of several thousand dollars' worth of online expenditures to the account of an expatriate while he was out of the country. The culprit was later apprehended, ordered to repay the money in instalments, but not punished.

Another case, which may not fall under some traditional definitions of cyber crime, involved a US citizen who set up a website called Cambodian Rape Camp. It greeted visitors to the website with the words "Welcome to the Rape Camp! Welcome to the Year 2000. Welcome to Kampuchea. It's not just live video chat. It's an international experience."[31] Sexual acts were performed on request for time charges by credit card. The operator claimed that he was providing an income-earning opportunity for Cambodian women and even tried, but in vain, to get support from the US Embassy to support his introduction of this free market economy oriented enterprise. Fortunately, he was expelled from the country. This affair was widely discussed in the press. Suggestions for introducing "censorship on the Internet" were made during these discussions.

The question of content censorship in Cambodia has been put to rest by the Secretary of State in the Ministry of Information, who stated that there would be no censorship and no intention to introduce it.[32]

The right to "secrecy of correspondence by mail, telegram, fax, telex and telephone" is guaranteed in the Constitution of 1993,[33] though the Internet is not specifically mentioned.

Cambodia is not yet a member of WTO, though preparations are underway towards that goal. Intellectual property rights are currently not widely respected, as evidenced by the many shops openly selling copied CDs and books from international publishing houses.

There is awareness that the present stage of IT development in Cambodia needs drastic changes. Studies by ITU in 2001 and the World Bank all converge on one central point: the necessity to separate regulatory, operational and business functions:

The ITU is currently working with the MPTC on restructuring in the telecom sector. Cambodia Telecom is to be formed soon to handle the operations side of the enterprise. The regulatory side will stay within the ministry. A new telecom act is currently in the works, with the intention of separating the regulatory functions from the ministry in two to three years.[34]

World Bank consultancies came to a similar, strongly worded conclusion: "Doing nothing in not an option, MPTC as it is, cannot long survive."[35]

Open source movement

There is nothing in Cambodia that would merit the name of an open source movement, though this issue is not unknown. Linux network servers have been in use in Cambodia since 1996. The challenge "to avoid dependency on proprietary systems, instead promoting open systems and interoperability" was mentioned in the closing remark of Senior Minister Sok An at the 2001 IT Awareness Seminar.[36]

The alternative to piracy provided by open source software, as the use of illegally copied proprietary software becomes more and more restricted, was raised in a detailed commentary in *Cambodia Daily*.[37] The article estimated that Cambodia would have to pay about US$5 million per annum for basic software licences alone, if software use were to be regulated.

The Open Forum of Cambodia has been using Linux for its e-mail system and has promoted this solution for servers installed at other organisations. Studies are underway to put a Linux-based small office package together, supported by a Linux users' mailing list.

Preparations are also underway to create a Unicode-compatible Khmer encoding for Linux by early 2003.

Research into ICTs

There are very few publications available in the country that could confirm the presence of genuine ICT research. Cambodia is at the early stages of organising IT education at the Royal University of Phnom Penh's Computer Science Department.[38] Some years ago, there was talk that a Cisco Academy would be established at the same department. These discussions have moved on to the NiDA.[39]

Much of the linguistic research and input discussed at the Royal Academy and finalised at the Cambodian National Body for the standardisation of the Khmer script on computers towards a Khmer Unicode standard was provided by the Khmer Philology Project in Japan, a working group of Cambodians in Japan, Japanese and some people in Cambodia.[40]

Future trends

So far, the development sector in Cambodia has not discovered ICTs: "The international community has played a key role in launching, providing and nurturing the Internet in the Kingdom. The Internet was introduced, thanks to Canadian assistance, the leading Internet access provider started its business with Australian foreign investment, and almost all initiatives to provide affordable Internet access to the public have been launched by non-governmental organisations."[41] However, "what is lacking is what could be called 'Internet for Development': a large scale, visible initiative that binds the power of the Internet to Cambodia's urgent development needs".[42]

One important step to take towards the future will be the introduction of a unified encoding system for the Khmer language – not only agreements about the encoding, but also standards for the creation of interoperable applications. The first step may happen in 2003.

The implementation of recommendations made by ITU and World Bank consultancies will be crucial for preparing a general framework for the further development of ICTs in Cambodia. Proposals that are technically sound and feasible in terms of their management have been tabled. It is not yet clear whether the political will exists to move in the directions proposed. These include the reduction of anti-competitive regulations and the creation of a fair playing field for those who are willing to invest in the sector. It will require the untangling of regulatory, operational and business activities currently concentrated in the MPTC.

Some suggestions from the final report of a World Bank Public-Private Infrastructure Advisory Facility indicate where the future might lead:

> Open Access Networks – our team believes that *all* network owners should be obliged to operate them on an open access basis:
> • Shared facilities, non-discriminatory access
> • Separate accounting for *services* and *network* (separation of networks and services is happening around the world)
> • Encourages competition in customer service businesses[43]

> Unless tariffs are brought closer to costs, other legal or illegal methods will be found to exploit the gap.
> Main threats are VOIP and illegal gateways.
> Solution: bring tariffs closer to cost.[44]

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ISPs

Bigpond <http://www.bigpond.com.kh> (previously
owned by Telstra of Australia; now sold and renamed
Cogetel/Online)
Camintel <http://www.camintel.com> (Cambodian
owned)
Camnet <http://www.camnet.com.kh> (owned by MPTC)
Telesurf <http://www.telesurf.com.kh> (a wireless
broadband access provider)
Open Forum Information Exchange
<http://www.forum.org.kh> (belongs to the Open
Forum of Cambodia, restricted by regulations to text-
based services only)

Notes

1. <http://www.itu.int/ITU-D/ict/cs/cambodia/index.html>, p. 13.
2. ITU General Secretary <http://www.globalflow.com/archive/
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4. <http://www.camintel.com>, section on Education.
5. The IT Awareness Seminar (2001) <http://www.ocm.gov.kh/
nida/other_information.htm>.
6. Crackdown on CD Pirates, Factories. *Phnom Penh Post*,
27 September – 10 October 2002, p. 4.
7. CICC <http://www.cicc.or.jp/english/index.html>.
8. *Kanbojia ni okeru jôhôka no jôkyô*
<http://www.cicc.org.sg/ciccrp/C3ir20371.html>.
9. Personal communication with Ms Noguchi Tomoko, a
Japanese graduate student who conducted field studies in
Cambodia.
10. Khmer Students and Intellectuals Association and Khmer
Youth Association.
11. <http://www.forum.org.kh>.
12. <http://www.bigpond.com.kh/users/eojc/index-e.htm>.

13. Actually, the first e-mail system in Cambodia – the Open Forum Information Exchange <http://www.forum.org.kh> – was set up in 1994 to enable Mr Khieu Borin, the first student from Cambodia, to participate in this programme. He is now a lecturer at the Royal University of Agriculture in Phnom Penh.

14. <http://www.cambodiaportal.com>.

15. <http://www.domc.com.kh>. The offer of a Japanese version reflects probably some cooperation by personnel from Japan. Unfortunately, the Japanese link is broken.

16. <http://www.mpdf.org>.

17. <http://www.mpdf.org/mpdfk/how_k/howfr_k.htm>. The method for automatically downloading Khmer fonts into web text written in HTML has been developed by the Open Forum of Cambodia. It is offered free of charge to people and organisations interested in adopting this technique. It happens frequently that those who make decisions about setting up a website, and those who actually do it, have different conceptions, frequently to the disadvantage of visitors to such websites.

18. <http://www.seasite.niu.edu/khmer/Default.htm> and <http://www.cambodiaportal.com>.

19. <http://www.nida.gov.kh>.

20. <http://www.unicode.org/unicode/reports/tr28>, section 9.15 on Khmer. To quote from a report describing the problems: "The use of the following characters is discouraged; they are being considered for possible deprecation in a future version of the Standard. These characters should be avoided in the normal representation of Khmer text. Dependent vowel signs: Having these vowels represented by a sequence of two Unicode code points may be unexpected for Khmer implementers. Subscript letters: This approach uses an artificial coeng sign character which does not exist as a letter or sign in the Khmer script, and therefore departs from the ordinary way that Khmer is conceived of and taught to native Khmer speakers. Consequently, the encoding may not be intuitive to a native user of the Khmer writing system."

21. *Cambodia Daily*, 5 July 2001, p. 14. About 40 Internet cafés provide VOIP in violation of a 1997 law.

22. Regulations <http://www.mptc.gov.kh>.

23. Samdech Krom Preah Criticizes Telephone Companies. *Toussanak Khmer*, Vol. 5, No. 121, 2–8 August 2002 (English in *The Mirror*, No. 275).

24. <http://www.bigpond.com.kh/users/ngoforum>.

25. <http://www.khmer.cc/about>.

26. <http://www.itu.int/ITU-D/ict/cs/cambodia/index.html>, p. 10.

27. Formal opening speech <http://www.ocm.gov.kh/nida/other_ information.htm>.

28. Ibid.

29. The country domain ".kh" was created in 1996 and administered by Open Forum staff free of charge until the Ministry took over in 1998, charging US$200 for the first two years, while leaving the practical work of administration and maintenance of the domain name system (DNS) with the Open Forum. Subsequently, the price for two years was lowered to US$160, then US$70. The fact that the National Assembly and the Senate have their registrations outside of the country with ".org" reflects this situation. The local UN offices almost could not register un.org.kh, because the DNS administrator did not want to accept "un" as it has only two letters and it then wanted to make the acceptance of the requested URL dependent on presenting the not existing Phnom Penh City Business Licence for UNDP.

30. VOIP <http://www.mptc.gov.kh>. Also in *Cambodia Daily*, 23 February 2002, Internet Telephones Illegal, Government Says (and 5 July 2001, 10 August 2001, 14 September 2001, and 9 March 2002).

31. Study by Donna M. Hughes, University of Rhode Island, USA <http://www.uri.edu/artsci/wms/hughes/rapecamp.htm>.

32. E-mail from Bill Herod <camres@f46.forum.org.kh> (now <bill@everyday.com.kh>). Subject: Internet access in Cambodia. Date: Friday, 04 June 1999 17:30:

    Friends,
         I was pleased to receive the following message from H.E. Khieu Kanharith, Secretary of State, Ministry of Information.
         Yours,
         Bill

    June 3, 1999
    Dear Sir,
         I do not know where SCMP [*South China Morning Post*, Hong Kong] got this news ("Planned Net law 'threat to democracy,'" May 31, 1999), but I can assure you that I am the one who has been fighting and continues to fight for the freedom of Internet access and the free flow of information in general. Everyday I find in my e-mail all kinds of information including some mail insulting me.
         This is a fact of life. When we never attempt to control the import of books and magazines into Cambodia why would we want to block the Internet? What I said about the terrorist sites was only to express my concern over the price to be paid.
         Please be assured that I am very supportive of this form of communication and I will spare no effort in defending it. I hope you can help communicate this assurance to all of your subscribers and, if you have any problem concerning this issue, please feel free to contact me.
         Your sincerely,
         Khieu Kanharith

33. Article 40 of the Constitution. Citizens' freedom to travel, far and near, and legal settlement shall be respected. Khmer citizens shall have the right to travel and settle abroad and return to the country. The rights to privacy of residence, and to the secrecy of correspondence by mail, telegram, fax, telex and telephone shall be guaranteed.

34. <http://pulse.tiaonline.org/article.cfm?ID=309>.

35. <http://www.dba.org.nz/PDFs/Cambodia%20Final% 20Report.pdf>.

36. The IT Awareness Seminar(2001) <http://www.ocm.gov.kh/ nida/other_information.htm>.

37. Open Software or Dependency on a Quasi Monopoly? *Cambodia Daily*, 29 May 2002.

38. <http://www.camnet.com.kh/spd/computer_science.htm>.

39. [Senior Minister] Sok An Requests CISCO to Help NiDA Authority. Koh Santepheap <http://www.kohsantepheap daily.com.kh/Economy/sokan15_07.htm>.

40. See also Digital Opportunity Forum – Asian Diversity and the Role of Japan, session 2: Developing Local and Vernacular Content, DOT Force meeting jointly organised as an inter-ministerial meeting together with GLOCOM: "KPP and IKWS Khmer Philology Project coordinated by the Asia Pacific Association of Japan (APA-KPP) was organized in March 1999 to address these problems. It is composed of Cambodian Japanese, Japanese and people in Cambodia. I joined it and programmed the Intelligent Khmer Writing System (IKWS) that helps users to type correct Khmer text easily. This system is based on a coded character set proposed by Cambodian-Japanese colleagues, which follows features of Khmer script. The prototype of IKWS was made in December 1999, and was first demonstrated to the public in January 2000 at the 2nd International Conference on Khmer Studies in Phnom Penh. The coded character set and IKWS have been improved through consultation and cooperation with academic and governmental authorities and many people in Cambodia." <http://www.glocom.ac.jp/ dotforce/dof/handouts_final/sharada.pdf>.

41. <http://www.itu.int/ITU-D/ict/cs/cambodia/index.html>, p. 13. Page 14 describes the role of the Open Forum of Cambodia as an NGO and the first e-mail provider in Cambodia since early 1994.

42. <http://www.itu.int/ITU-D/ict/cs/cambodia/index.html>, p. 13.

43. <http://www.dba.org.nz/PDFs/Cambodia%20 Final%20 Report.pdf>, p. 16.

44. Ibid, p. 32.