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Myanmar

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Overview

There are indications that the State Peace and Development Council, the governing body of Myanmar, realizes that ICT can help to improve social and economic conditions. There are dedicated and concrete efforts at ICT development. Thus, although Myanmar is at an early stage of ICT development, there is a clear potential for developing a viable ICT industry and effective use of ICT to make the country more productive and competitive in the international market.

ICT Parks have been established in Yangon and Mandalay, the two former capital cities. Moreover, construction of a new Yadanabon cyber city is progressing speedily. It is intended to be a self-contained city with a teleport, an incubation centre, local and foreign software and hardware companies, residential areas and a shopping centre, among others.

There are efforts to formulate national ICT policies. The two ICT Master Plans, the ICT Master Plan Framework for 2001–05 prepared by the Myanmar Computer Federation and the Myanmar ICT Development Master Plan for 2006–10 prepared by the e-National Task Force, provide general guidelines for ICT development efforts. Unfortunately, the plans have not been officially adopted and their implementation is now being evaluated.

There are noticeable improvements in the ICT infrastructure even if it is still very weak at present. The construction of the national backbone linking the major cities by fibre is progressing satisfactorily. The grid will cover more than 15,000 kilometres. A satellite link is also being established to cover the remote areas that the fibre link cannot reach. The international bandwidth is still too low to meet the demand but there is a good effort to improve the situation. The big challenge is improving the last mile link to enable universal access. Reliability and affordability are the two key issues for future development.

The legal framework for ICT development needs to be improved considerably. Only the Computer Science (ICT) Development Law and the Electronic Transaction Law have been promulgated. The Telecommunication Law and IPR laws are at the draft stage. Myanmar may need to work closely with the international community in the preparation of its cyber laws.

The ICT industry is at the infancy stage and its contribution to national GDP and export is still negligible. e-Government has been initiated through efforts to establish an e-government network and data centres. However, there is little effort to develop the appropriate applications. Moreover, while there was a big plan and initial efforts for e-education development, the results were not satisfactory. Two computer universities and 24 government computer colleges have been set up throughout the country with the goal of producing 1,197,350 professionals. But shortage of faculty members, facilities and quality standards undermine the effort. Other key issues are training for trainers, courseware development, operation and maintenance.

ICT infrastructure

Building and upgrading the ICT infrastructure is the most basic and most important component of ICT development. The ICT infrastructure is the essential prerequisite of ICT applications and ICT industry development, e-commerce, e-government and e-learning. As ICT infrastructure requires high-tech equipment and personnel, it also has a critical impact on economic development.

However, Myanmar's current ICT infrastructure is very poor even among developing countries, as the following will suggest:

* Teledensity, including mobile telephony, is only 1.23 per cent, among the lowest in ASEAN countries.
* The number of Internet users is too small.
* The telephone supply does not meet the increasing demand.
* Most of the switching systems are manual, with a small capacity.
* The transmission systems consist mostly of microwave systems.
* The Myanmar Posts and Telecommunications (MPT) buries cables underground instead of installing ducts or poles, which implies that maintenance and repair cost may be high in the future.
* The Ministry of Communications, Posts and Telegraphs (MCPT) provides all telecommunications services, including fixed and mobile access, and local, national and international calls and leased lines.
* There is no plan to separate the business part from the administration in the near future.
* Telecommunications personnel are unskilled.
* There is no billing system in place.

On the other hand, the demand for telephone services is very high and has a great potential. Also, the average revenue per user (ARPU) is increasing, which implies that there are network externalities for returns on investment to increase in the future.

The development of the infrastructure for fixed-line telephones has been delayed for various reasons. One important reason is lack of funds due to insufficient foreign currency and the current tariff rate structure for telecommunication use.

Until recently, the access line of fixed-line subscribers had been copper-wire cable. Bagan Cyber Tech (BCT) is now providing Wireless Local Loop (WLL).

MPT is the only organization providing mobile telephone service. An Advanced Mobile Phone System (AMPS) and Digital-AMPS (D-AMPS) are currently in use. CDMA and GSM, the second generation mobiles (2G), were introduced in 1997 and 2002, respectively. MPT plans to install a GSM system in about 20 cities in border areas, as well as in coastal areas.

The telecommunication network system consists of the following:

Exchange

Auto Exchange	137
Manual Exchange	640
Transit Exchange	4
International Exchange	2
Mobile Exchange	6
Packet Exchange	1
Internet Gateway	2

Microwave Stations

Digital	181
Analogue	79

Earth Stations

International Stations	1
Domestic Stations	416
International Submarine Cable Landing Point	1

A Data Communication System has been in use in Yangon and Mandalay since 1997.

Myanmar carries out overseas communication services through satellite system and the Asia-Europe underwater cable system. The country has been linked to the Internet with 57 lines since 1999. There are two Internet Service Providers (ISP). MPT is the only gateway to foreign countries. The current bandwidth is 64 Mbps. As of August 2006, there were about 88,500 Internet users using dial-up (74 per cent of users), ADSL (13 per cent of users), WLL (7 per cent) and satellite terminal (6 per cent). Cybercafés, which emerged in 2002, increased the number of Internet users among the general public. There are 17 cybercafés in Yangon and three in Mandalay.

The number of personal computers per thousand inhabitants remains low: 5.1, 5.6, 6.6 and 7.3 in 2002, 2003, 2004 and 2005, respectively.

Yangon, the former national capital, is the centre of the nationwide network. MCPT is constructing optical fibre backbone routes within Myanmar. The fibre link between Yangon in lower Myanmar and Mandalay in upper Myanmar, and linking major cities, has already been completed.

The WLL service provided by BCT has a transmission speed of 128 Kbps to 2 Mbps. The system was installed first in business areas and has been expanded to cover the whole municipal area of Yangon. The biggest advantage is its affordability: the price is estimated to be one-fifth of the current system. BCT also introduced Broadband Satellite Data Service using iPStar by means of Thaicom 4 Satellite in 2002. The system is primarily intended to provide network services in rural areas.

A VSAT system, called DOMSAT (DOMestic SATellite system), is under operation as a telephone network to connect Yangon and 10–20 remote cities. However, some parts of the system fail and the usage rate is rather low.

Cross-border fibre links between China and Myanmar, India and Myanmar, and Thailand and Myanmar have been set up. International telecommunication is provided through

the Sea-Me-We3 submarine cable system and INTELSAT earth station, directly linking Myanmar to 34 countries. MCPT plans to build another international switch and earth station in Mandalay, which will increase the reliability of the international telephone network.

While the building of the national backbone and international links is progressing satisfactorily, improvement of the 'Last Mile Link', which links subscribers to the backbone, seems to be very slow. BCT is working on introducing ADSL to improve the last mile link. Both, MPT and BCT plan to expand the IP-based VSAT and iPstar broadband network to the villages. It is necessary to formulate policies to increase ICT accessibility in the rural areas with concrete implementation measures.

ISDN (Integrated Services Digital Network) has been provided in some parts of Myanmar. In the future, however, the whole telecommunication network will be more and more IP-based. At the moment, the introduction of IP-related technologies is way behind in Myanmar. This is due not only to the technological or hardware problems, but also to the immaturity of policies and institutions to promote and administer the spread of these new technologies. The conventional telecommunication technologies were developed with the involvement of the central government. However, the new IP-related technologies have been developed in an atmosphere of open discussion among academic groups and the private sector. It is necessary to develop this environment of academic and private groups. The IP-based network will be developed as a common infrastructure for the

transmission and processing of all kinds of information. From this point of view, Myanmar has to study the development of Internet-related technologies and related institutions in other parts of the world and begin to develop an adequate institutional structure for an IP-based telecommunications network.

Moreover, the telecommunication infrastructure in industrial zones needs to be improved considerably, as both teledensity and Internet access are insufficient. The development of the telecommunication infrastructure in the industrial zone to support ICT applications development should correspond with industrial development policy and priorities.

The cost of Internet access in Myanmar is the highest among ASEAN countries. It is necessary to reduce the Internet access cost considerably. Strategic plans for an affordable pricing mechanism for telecommunications and Internet access services, especially for priority groups such as educational and health institutions and rural areas, need to be put in place.

Key institutions dealing with ICTs

Myanmar introduced ICT quite early. The first computer centre, Universities Computer Center (UCC), was established in 1971. In the mid-1980s there were efforts to introduce e-government mainly for administrative purposes via the Computing Development Project (CDP), a UNDP project. But there was no national ICT development policy.

The organizations responsible for ICT development in Myanmar are shown in Figure 1.

Figure 1
Key ICT Institutions in Myanmar
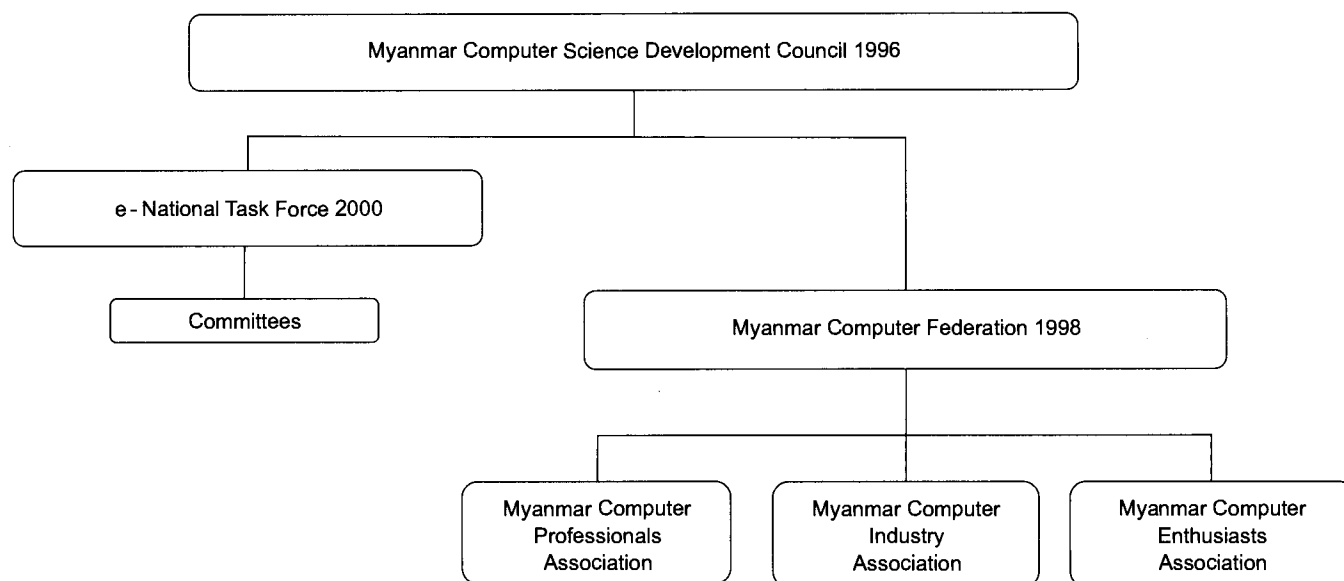
Myanmar Computer Science Development Council

The Myanmar Computer Science Development Council was established following the promulgation of the Myanmar Computer Science Development Law on 20 September 1996. The Council is the highest ICT policymaking and implementing body. It is headed by the Secretary of the State Peace and Development Council (SPDC). Its members include the heads of various Ministries, including Home Affairs; Communications, Posts and Telegraphs; Cooperatives; Information; Industry; Education; Science and Technology; Immigration and Population; Culture; Foreign Affairs; and Defence. Other members are the Director of the Directorate of Signals, the Director General of the Department of Higher Education, the rectors of the University of Computer Studies, Yangon and the University of Computer Studies, Mandalay, and the Director General of the Advanced Science & Technological Research Department.

e-National Task Force (e-NTF)

The e-National Task Force, which was formed on 30 October 2000, is responsible for the implementation of the e-ASEAN Framework Agreement. It is headed by the Minister of Communications, Posts and Telegraphs and its members are from the public and private sectors.

The functions of the e-NTF are as follows:

1. Give policy recommendations for the building of a National Information and Communication Infrastructure;
2. Develop regulatory and legislative frameworks for e-commerce development in accordance with international standards and practice;
3. Coordinate with government agencies in the implementation of the e-ASEAN Framework Agreement;
4. Prepare an implementation plan for ICT applications development;
5. Provide estimates of resources needed for the implementation of projects for improving e-readiness; and
6. Evaluate ICT projects.

Myanmar Computer Federation (MCF)

The Myanmar Computer Federation, an NGO formed in 1998, consists of representatives of three associations—the Myanmar Computer Professionals Association (MCPA), the Myanmar Computer Industry Association (MCIA), and the Myanmar Computer Enthusiasts Association (MCEA)—as well as representatives of government agencies dealing with IT. The federation and the three associations under it do a good job of raising awareness of ICT.

Specifically, the MCF is tasked with promoting the utilization of computers in different areas of work through training courses, lectures, competitions and study tours; developing computer science curricula for computer training schools; developing standards and an accreditation system for computer training schools; giving assistance to manufacturers to enhance the quality of computer hardware and computer software; conducting and supporting computer science research; liaising with international computer organizations; developing computing in the local language; compiling, publishing and distributing publications on computers; developing computer literacy especially among young people and helping develop outstanding computer scientists and inventors; and recommending to the Council honorary titles and awards for outstanding computer scientists and inventors.

The three associations under the MCF may be briefly described as follows: the MCPA is an NGO composed of ICT professionals, the MCIA is an NGO composed of ICT companies, and the MCEA consists of individual computer users.

The e-National Task Force, which is a public institution, and the MCF and the associations under it from the private sector side, work closely under the guidance of the Council.

Ministry of Science and Technology (MOST)

The Ministry of Science and Technology, created in 1997, is responsible for ICT human resource development. Two computer universities, one each in Yangon (University of Computer Studies, Yangon) and Mandalay (University of Computer Studies, Mandalay), and 24 government computer colleges (GCC) dedicated to ICT professional education have been established under the Ministry.

ICT policies

The first ICT Master Plan prepared by the MCF was approved by the Myanmar Computer Science Development Council in 2001. The second plan, covering the period 2006–10, is called the Myanmar ICT Development Master Plan and Action Plan. Both Master Plans guide all ICT development efforts in Myanmar.

The Master Plan specifies the following broad mission elements:

1. Widespread application of IT in state management with the intention of providing better services to the public, improving efficiency, and reducing costs;

2. Widespread application of IT in business organizations to improve productivity and render better services;
3. Utilization of IT as a low-cost communication infrastructure for the smooth operation of socio-economic organizations;
4. Utilization of IT as a vehicle for business organizations penetrating the international market;
5. Widespread application of IT to improve the educational level of the whole population;
6. Development of the IT Industry to become one of the main economic sectors;
7. Development of IT human resources;
8. Creation of an IT-intelligent society;
9. Facilitation of the growth of e-commerce; and
10. Reduction of the digital divide.

ICT Industry

According to a survey of 250 companies conducted in 2005, 27.46 per cent of the companies surveyed are engaged in training, 27.14 per cent are in hardware sales, 11.59 per cent are in system integration, 8.55 per cent are in network solutions and 24.70 per cent are in software development and others. Most are members of the MCIA. About 75 companies have offices in the ICT Parks established by the Myanmar Info-Tech Corporation. The IT market is estimated to grow between 10 and 20 per cent per year, largely due to Internet-related IT services.

The commercial market consists mainly of customized applications such as accounting packages, computer-based training (CBT), Web-enabled applications and multimedia design. Most of the end-users are banks.

The government is the largest consumer of information technology. However, there is as yet no government-wide information system and there is no effort at standardization of telecommunications, hardware and software. Standardization and compatibility of data models and structure and telecommunications protocols, need to be addressed.

The IT Industry Association was established to focus on marketing and promotion, and to foster networking and collaboration among ICT companies. This consortium of 50 ICT companies was formed in 2001 by the Myanmar Info-Tech Corporation in order to develop the Myanmar ICT Park with international facilities in Yangon and Mandalay. Other goals of the consortium are to develop a home-grown solution for e-government, provide ICT-related services, provide infrastructure for ICT companies, tap local and overseas markets, and develop human resources.

To improve the capabilities of ICT companies, the Myanmar Info-Tech Corporation and MCF conducts seminars and workshops, training courses, an on-site training programme (jointly with CICC, Japan), and an on-the-job training programme (jointly with AOTS, Japan). The corporation and MCF are also collaborating on the development of a Software Quality Certification (CMMI) Programme with Software Park, Thailand. A business matching programme, trade shows and exhibitions, and the National ICT Awards programme are also arranged by the associations under MCF.

In 2002, a consortium of private companies established the Myanmar ICT Park, a special zone where adequate facilities and support are provided for ICT companies.

There are many efforts by MCF for international cooperation. However, cooperation through ASEAN is not yet fruitful.

e-Government

Myanmar is at the very low end of the UN's e-Government Readiness Index: 123rd among 191 countries. Its Web index rank is 100th; its telecom index rank is 182nd (weakest point); and its human index rank is 122nd.

The current ICT Master Plan states that e-government should be given priority. Widespread application of IT in state management is envisioned to provide better services to the public, improve efficiency and reduce costs. The Master Plan also states that as the biggest buyer of IT products and services, the state should act as the main demand force for domestic IT application growth, and that it should establish demonstration projects to show the benefits of IT applications to motivate the public and private sectors and the whole population to use IT extensively. However, except for these broad statements, there is no specific e-government plan.

At present, the e-NTF is the focal point for computerization of government agencies. It is tasked with preparing an e-Government Master and Action Plan, training government employees, and building infrastructure. Under the direction of the e-NTF, all government agencies at ministry and department or enterprise level have already appointed a Chief Information Officer (CIO).

The Yangon City Development Council (YCDC) and Mandalay City Development Council (MCDC) are active in computerization. They have developed and maintained their own websites and some operations, such as tax collection and building registration, are already computerized. On the other hand, there is no information that other local government agencies have any IT plan. The IT development effort at state/division level is still very low. Most agencies do not have any e-government project, although some ministries, departments and enterprises have formed computerization steering committees.

PC penetration (the number of PCs per employee) is still very low in government agencies. The agency with the highest PC penetration has 0.3 PCs per employee, which means that three employees share one PC. The lowest rate is 0.002. There are still some government agencies that do not have computers. Five agencies have one or more information systems but only 11 per cent provides public services online.

Governmental IT System Development consists of infrastructure building and development of application systems particular to each government agency. Currently underway is the Myanmar Basic e-Government System project with a loan of more than USD 10 million from the Daewoo International Corporation & KCOMS Co. Ltd., Korea. It includes a Basic Database Management System, including common applications and data exchange.

Legal and regulatory environment for ICTs

By enacting or amending ICT laws based on a concrete roadmap, the Myanmar government will be able to not only overcome a stagnant telecom market but also drive economic growth. An ICT legal framework is a very important part of ICT development. Whenever there is a paradigm shift in telecom policies, the ICT legal framework has played an important role in achieving the goal of providing consumers with better services at a lower price.

To facilitate a regulatory environment that is supportive of National ICT Development, the following ICT related laws have been promulgated:

1. *Myanmar Computer Science Development Law* (State Law and Order Restoration Council Law No. 10/96): Promulgated in 1996, the law specifies the formation of institutions that will be responsible for ICT development in Myanmar, as well as their responsibilities and scope of authority.
2. *Electronic Transactions Law* (State Peace and Development Council Law No. 5/2004): Promulgated in 2004, this law aims to use electronic transactions technology in building a modern, developed nation; to obtain more opportunities for all-around development of sectors, including human resources, economic and the social and educational sectors, by electronic transactions technologies; to recognize the authenticity and integrity of electronic records and electronic data and give legal protection thereof in matters of internal and external transactions making use of computer networks; to enable transmitting, receiving and storing of local and foreign information simultaneously, making

use of electronic transactions technologies; and to enable speedy and effective communication and cooperation with international organizations, regional organizations, local and foreign government departments and organizations, and private organizations and persons.

The drafts of the new Telecommunications Law and Intellectual Property Rights Law have already been completed. The Telecommunications Law can lay the foundation for better services at lower prices by promoting market competition in the telecom market.

Education

There are good efforts at IT application in education. Most of the schools have a multimedia classroom and there is an educational intranet. But there is a lack of well-planned and coordinated efforts for effective use of the facilities. There are 1,712 high schools, 3,099 middle schools and 36,004 primary schools in Myanmar. A total of 991 schools have been designated as Multimedia Schools. Of these, 238 have been upgraded as Electronic Learning Centres. More schools will be upgraded in the coming years. In the meantime, schools are encouraged to study the possibility of acquiring technology through their own initiative.

Computer universities and colleges, as well as certification programmes, have been established. But there is a need to improve quality. Yangon University and Dagon University under the Ministry of Education also provide Bachelor, Diploma and Master's degree courses in ICT.

The ICT industrial base is very weak in Myanmar. Consequently, the employment share of ICT occupations is still very low. Among ICT occupations, computer programmers account for the lion's share. Among a sample of 3,343 workers, 17 per cent are computer programmers, 14 per cent are computer support specialists, 11 per cent are computer operators, 10 per cent are computer software engineers, 8 per cent are computer hardware engineers, 8 per cent are computer repair staff, 8 per cent are computer and information systems managers, 7 per cent are network or computer systems administrators, 4 per cent are data entry and information processing workers, 4 per cent are systems analysts, 4 per cent are desktop publishers, 3 per cent are Web masters, 2 per cent are database administrators, 1 per cent are computer scientists, and 1 per cent are computer-control programmers and operators. According to an MCF ICT survey conducted in 2005, the pattern of future demand for ICT workers is likely to be the same as the existing occupational pattern. The most needed occupations include computer programmers,

computer and information systems managers, and computer software engineers.

ICT occupations pay higher wages than other occupations in Myanmar. ICT fields are popular among students and it is relatively easy to attract top domestic talents to ICT fields. In terms of labour cost, Myanmar's ICT sector has an advantage over equivalent sectors in neighbouring countries. For example, the monthly wage of a computer programmer in Myanmar is only about a third of the monthly wage of a computer programmer in India.

On the other hand, the number of IT researchers/engineers in Myanmar is negligible. The computer universities are offering PhD courses, the students of which can be considered as IT researchers. As of November 2006, there were about 90 who had completed these PhD courses and about 74 doing their thesis.

MCF established a small ICT Research Centre in 2004. Most of its research work is on Natural Language Processing. MCF and its associations also provide ICT professional training. There are around 90 private computer schools, including 70 in Yangon. Altogether, these institutions produce about 900 ICT professionals annually. Most of the private training centres offer Basic Computer Skills Courses such as MS Office, desktop publishing, e-mail and Web design, graphics design, Introduction to the Internet, AutoCAD (Engineering Drawing), ACCPAC Plus (Computerized Accounting) and Multimedia Creation. Some offer professional courses such as Software Engineering, Software Engineering in Database & e-Commerce, Network Engineering, Specialized Programming Courses, Networking with Linux and Practical Network (Server-Based), as well as Oracle, CISCO and Microsoft Certification Examination Courses.

Informal certification programmes were also initiated recently. The MCPA certification programme has been successfully implemented and the Japanese Information Technology Examination Center (JITEC) and MCF have entered into an agreement to implement a cross-certification programme. The Japanese Information Technology Engineer Examination (JITEE) has been conducted twice a year since 2002. These programmes provide IT training opportunities to those who cannot afford or who do not want to join formal education

programmes. Bilateral, regional and international certification programmes such as JITEE should be implemented effectively and systematically promoted.

An e-Learning Centre was established in 2001 with support from Japan. The centre is currently providing training courses for JITEE. The e-Learning Centre should be strengthened to become a full-fledged centre providing all of the facilities needed to support informal ICT human resource development.

It should be recognized that the quality of ICT professionals in Myanmar still needs to be improved to meet international standards. This gap should be closed quickly through effective human resource development programmes.

Towards an ICT society

Most of the current efforts in Myanmar are in improving awareness. IT literacy is still very low for the whole society. The Myanmar Computer Federation and the three associations under it have conducted an 'IT Caravan' to the rural areas, with support from MCPT and the Center of the International Cooperation for Computerization (CICC), Japan.

There are good initiatives to narrow the digital divide between urban and rural areas, such as the establishment of Public Access Centers (PAC). However, the weak telecommunication infrastructure and high costs continue to widen the digital divide. There is a need for specific measures to liberalize investment, production and distribution of IT products and services. There is also a need to give business organizations special incentives for using IT.

References

Information and Public Relations Department. (2002). Transport, construction and communications. In A. Myo Thant, B. Maung Hlaing, C. Soe Myint and D. Tin Tin Win (eds). *Myanmar facts and figures 2002.* Yangon: Ministry of Information.

Information and Public Relations Department. (2003). Endeavours made on economic development of the State. *Magnificent Myanmar (1988–2003)* (1st ed.). Yangon: Ministry of Information.