Thailand ICT Indicators
moving towards the information society

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Contents

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Introduction

In the modern world, Information and Communications Technologies (ICTs) play an ever more important role in our lives, infiltrating every segment of society and the economy. At the same time, ICT is a vital component of the push by various countries to enter the "new economy," sometimes referred to as a "knowledge-based society" or information society.

Thailand's approach to the application of ICT in social and economic development is laid out in the IT 2010 Policy Framework, which has met with Cabinet approval; and the ICT Master Plan 2002-2006, drawn up in response to rapid technological developments. Both of these policy documents accord with the 9th National Economic and Social Development Plan. The master plan lays out administrative, monitoring, and assessment mechanisms, setting targets and achievement indicators for the overall plan, as well as for each strategy.

However, to date Thailand has not collected information or statistics in regard to ICT on a continuous basis. Any data that has been collected has been done in a piecemeal manner and, in several instances, has been conducted on an *ad hoc* basis, thus making it difficult and cumbersome to assess the overall ICT situation. Moreover, some important data and statistics have not yet been collected, such as data on the workforce employed in the ICT sector, the expansion of education in the form of e-learning, the number of students graduating with qualifications in network computing, or the number of employees who are able to access ICT.

This lack of data and statistics has been a crucial obstacle to the assessment of results as stipulated by the blueprint. It is thus necessary to conduct studies into approaches to conceptualizing and collecting data and statistics as mentioned in the blueprint in a systematic manner and on the basis of academic principles. After the suitable approach has been identified, it will be possible to propose these approaches and methods for collection to relevant organizations, which can then apply them to the collection of data and statistics for which they are responsible.

The National Electronics and Computer Technology Center (NECTEC), the National Science and Technology Development Agency (NSTDA), the Ministry of Science and Technology, and the Ministry of Information and Communication Technology have therefore jointly worked on a project to develop national ICT indicators which aimed at collecting statistics and data necessary for analysis of the nation's ICT situation.

Work on this project has been divided into three stages. The first stage involves the deliberation and selection of which data, statistics, and indicators should be collected, in order to benefit monitoring and assessment as stipulated in the ICT Master Plan. The second phase involves the collection of current national data and statistics about ICT, while the third phase involves studies of approaches to the collection of data and statistics as yet unavailable.

In the first phase, the working committee has collected some data and statistics that are vital to executives and policy makers in both the public and the private sectors, as well as to the general public interested in the nation's ICT development. The committee has thus drawn up this document to disseminate these ICT data and statistics, in order to further recognition and understanding of the issues involved.

This document has classified important ICT data, statistics, and indicators into 10 groups: Telecommunications, Internet, Broadcasting, E-Commerce, ICT Market/Industry, ICT Human Resources, ICT in Government Sector, ICT Regulatory Framework, Research & Development and Patents, and General Economic Information.

The project owner hopes that readers will benefit from these initial studies, but it must be remembered that this document represents Thailand's first efforts at gathering data and statistics that have hitherto been dispersed. As a result, there may be some places where the information is incomplete. The project team shall thus work to ensure that the collection of ICT data and other information will be made more thorough in the future.

Telecommunications

Telephones are a vital factor in linking social communities. Forms of communication change in line with technological progress, and today telecommunications services range from basic telephone services to mobile-telephone, data, and Internet services.

In Thailand, the use of telephone has risen steadily, with the penetration of fixed-line phone equivalent to 13.1 percent of the population in the first quarter of 2003. However, in recent years the growth has been slowed, due to the rapid expansion of mobile-telephone services.

Today the major fixed-line service providers include TOT Corporation Public Company Limited, formerly a state enterprise under the Ministry of Transport and Communications until it was privatized in 2003. There are also two private companies that have been awarded concessions to operate fixed-line services: TelecomAsia Corporation, which serves Bangkok and its surrounding provinces; and TT&T Co., Ltd., which operates in the upcountry. As for international telephone services, the Communications Authority of Thailand (now CAT Telecomm Public Company Ltd.) is the sole provider, with the exception of services to countries that share a border with Thailand, namely Myanmar, Laos, Cambodia, and Malaysia, which are covered by TOT Corporation.

Analog wireless telephone services were introduced to Thailand in 1986, and these early analog services later went digital. There are at present seven mobile telephone service providers as follows:

Digital mobile phone service providers
- Advanced Info Services Plc. (AIS): GSM 900-MHz and GSM 1800-MHz mobile phone,
- Total Access Communication Plc. (DTAC): cellular and digital 1800-MHz mobile phone,

- TA Orange Co., Ltd. : digital cellular and 1800-MHz mobile phone.
- Thai Mobile Co., Ltd.: 1900-MHz CDMA mobile phone,
- Hutchison CAT Wireless Multimedia Co., Ltd., which has received
  a concession from the Communications Authority of Thailand to
  operate digital CDMA mobile phone.

Analog mobile phone service providers
- TOT Corporation Co., Ltd.: 470-MHz or cellular 470 mobile phone,
- The Communications Authority of Thailand: cellular AMPS 800
  A-Band mobile phone.

Presently, AIS holds the highest market share with 65 percent, while DTAC's
market share stands at 32 percent, and TA Orange's is only 3 percent.

Figure 1:Telephone Availability

Source: TOT
Remarks: *as of March 2003

Figure 2: Fixed lines per 100 inhabitants

Lines

Year	97	98	99	'00	'01	'02	'03*
Lines	11.4	12.1	12.3	12.5	12.6	12.9	12.9

Source: TOT
Remarks: *as of March 2003

Figure 3: Mobile Users

Mill.   %

■ No. of Mobile Users
— % of Population

Year	'00	'01	'02	'03*
No. of Mobile Users	3.5	8.0	17.4	19.3
% of Population	5.6	11.8	27.7	30.6
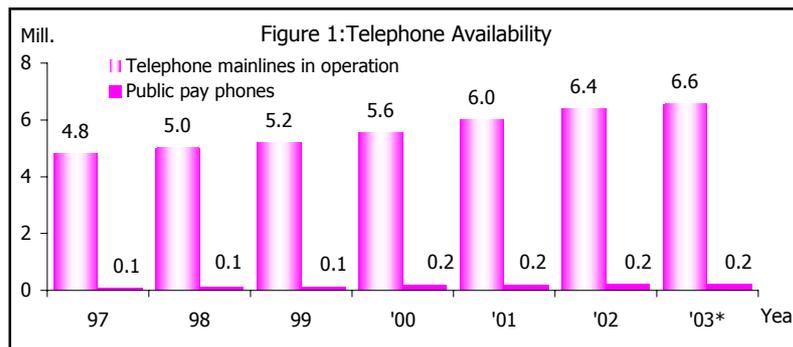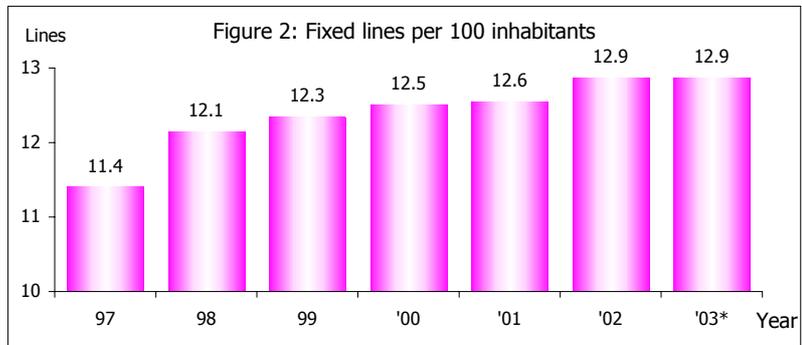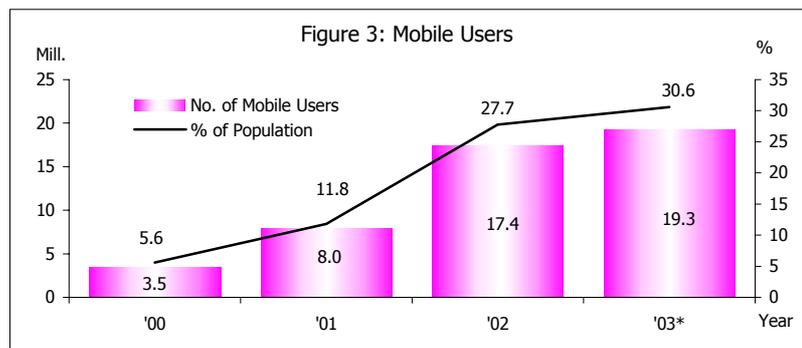
Source: TOT, CAT
Remarks: as of May 2003

Figure 4: Mobile Users by Region (2003)

Central
36%

South
25%

North
23%

Northeast
16%

Source: NSO
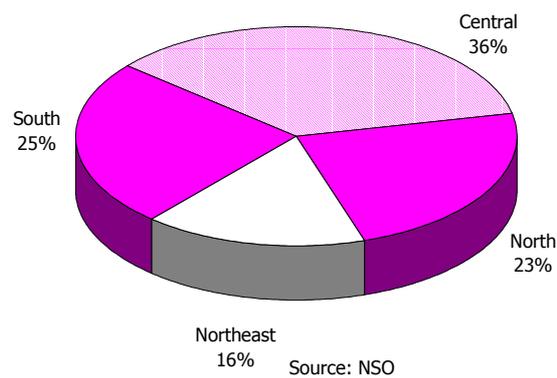
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Internet

The Internet was first used in Thailand in 1987, when an e-mail communication was used between Prince of Songkhla University's Hat Yai campus and Melbourne university in Australia, in a cooperation project with Australian government called the International Development Plan (IDP). Asian Institute of Technology (AIT) joined the program and established the early network and .th domain in Bangkok. In 1992, the National Electronics and Computer Technology Center took the central supportive role for the whole academic and research network in Thailand under the name of "ThaiSarn". By 1994, all state-owned universities were online with the Internet. In 1995, the first commercial Internet Service Provider started its operation.

Since 1995, the growth of the international bandwidth of Thailand was more than 200% each year. The popularity of Internet usage in Thailand has soared during the period 1999-2003, with the average annual growth in Internet usage stood at 58.3 percent. There are 13,116 domain names under .th in August 2003. The popularity of the Internet can be attributed to the fact that it is a new form of borderless communication technology offering a diverse range of services, such as the opportunity to keep up with new information, the use of instant messaging (ICQ, MSN) and chat services, the use of Web boards, the search for information, the purchase of goods, the chance to play online games, or to download games, software, and music.

Yet despite the drastic increase in Internet usage, a wide gap has developed between the population of Bangkok and other provinces in terms of Internet access. Thirty-three percents of Thailand's Internet users are based in Bangkok indicating that people living in upcountries have fewer opportunities to gain access to new information and knowledge via the Internet than do people living in Bangkok and the surrounding areas.

However, efforts are made to expand Internet access, whether through the Thailand SchoolNet Project linking up schools, the establishment of community telecenters, or the Internet Tambon Project. In addition, the new low-cost computer program initiated by the Ministry of ICT added more than 150,000 new computers to the market, all with the capability to access the Internet. All of these projects will help support the use of ICT and increase the number of Internet users in different regions of the country.

Figure 5: Computer Users, Internet Users, and PC in Household (2003)
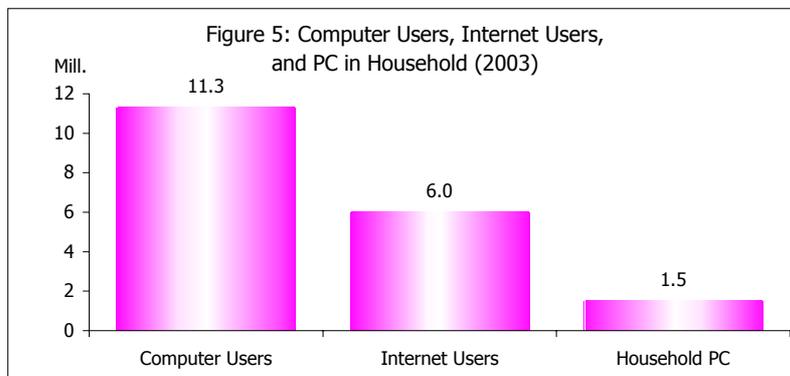
Source: National Statistical Office (NSO)

Figure 6: Internet Users
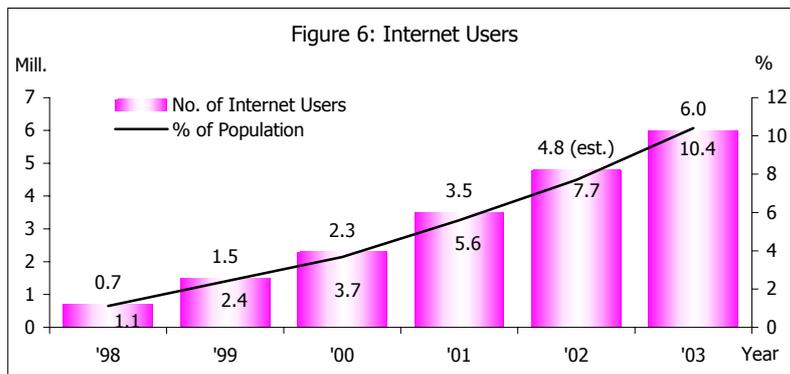
Sources: ISP Club, NECTEC, NSO
Remarks: * The NSO calculation for the year 2001 and 2003 are based on the number of population at 6 years of age and over.

Figure 7: Internet Users : Bangkok vs Others

Year	Bangkok	Others
'03	33.3	66.7
'01	34.9	65.1

(Percentage scale: 0% – 20% – 40% – 60% – 80% – 100%)
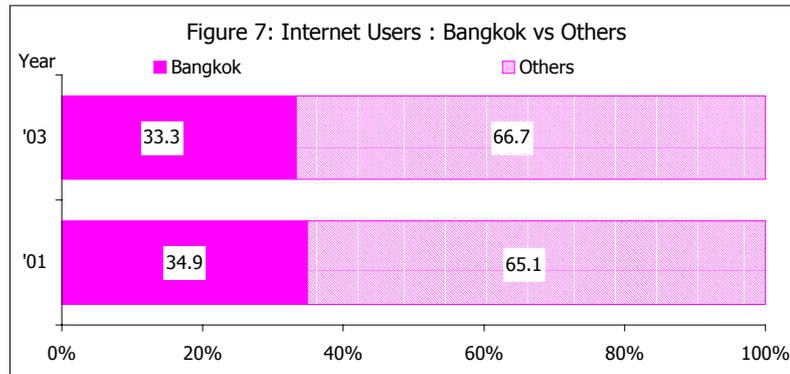
Source: NSO

Remarks: The NSO calculation are based on the number of population at 6 years of age and over.

Table 1: Internet Penetration

Region	No. of Users (Mill. Persons)		Users per 100 inhabitants	
	2001	2003	2001	2003
Whole Kingdom	3.53	6.03	5.64	10.43
- Bangkok	1.23	2.01	16.00	26.86
- Northern Region	0.52	1.34	4.57	10.08
- Central Region	0.83	1.00	5.85	9.68
- Northeastern Region	0.56	1.07	2.64	5.59
- Southern Region	0.39	0.62	4.72	8.15

Source: NSO

Figure 8: Internet Users by Gender

Year	Female	Male
'99	34.9	65.1
'00	49.2	50.8
'01	51.2	48.8
'02	53.4	46.6
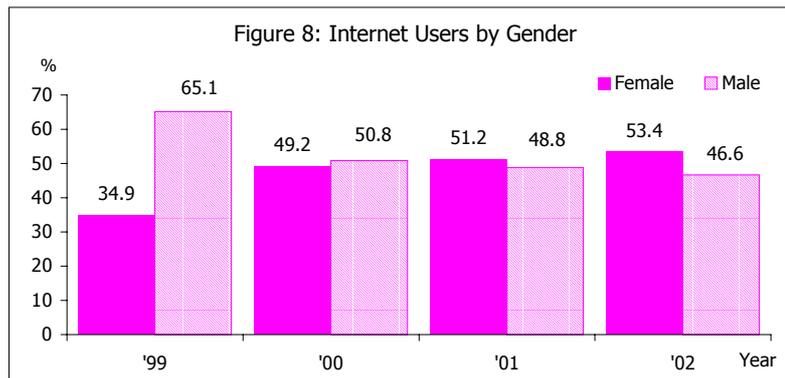
Source: Internet User Profile Survey, NECTEC, 1999-2002
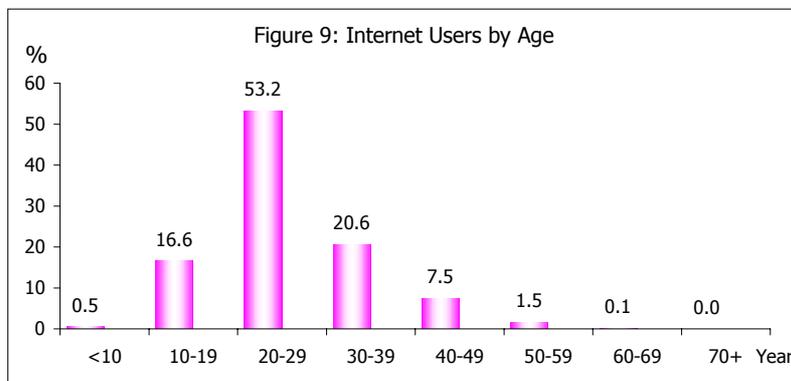
Figure 9: Internet Users by Age

%

Age	%
<10	0.5
10-19	16.6
20-29	53.2
30-39	20.6
40-49	7.5
50-59	1.5
60-69	0.1
70+	0.0

Source: Internet User Profile Survey, NECTEC, 2002

Figure 10: Average Online Time Per User (hours/week)

Hrs/week

Year	Hrs/week
'99	9.7
'00	10.6
'01	10.4
'02	10.9

Source: Internet User Profile Survey, NECTEC, 2002

Figure 11: Internet Access in Schools (SchoolNet Subscribers)

No. of Schools

Year	No. of Schools
'98	569
'99	1,228
'00	2,126
'01	4,021
'02	4,622
'03*	4,654
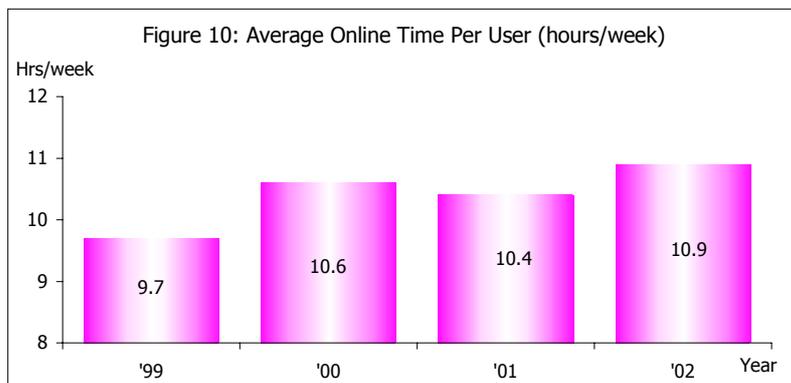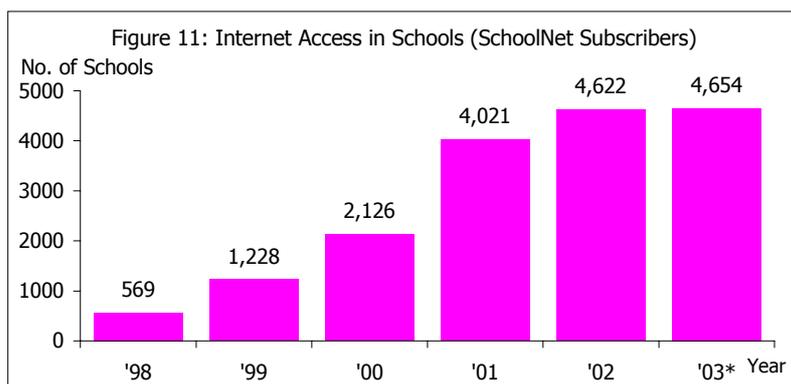
Source: NECTEC
Remarks: *as of August 2003

Figure 12: Distribution of .th Domains Names (as of Aug. 2003)

ac.th
7.4%

or.th
4.2%

net.th
0.2%

mi.th
0.1%

in.th
10.2%

go.th
2.4%

co.th
75.5%

Total
13,116
domains
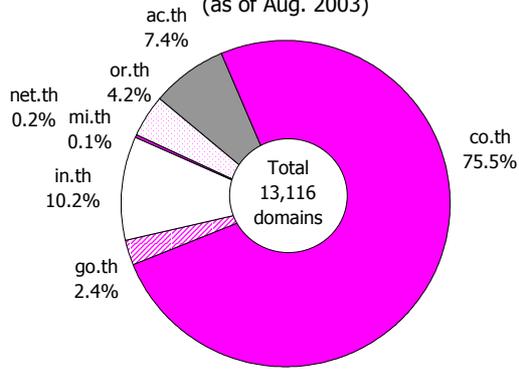
Source: THNIC

Figure 13: International Internet Bandwidth (end of period)

Mbps

- ■ To Thailand
- ▨ From Thailand

	'98	'99	'00	'01	'02	'03*
To Thailand	37	118	268	642	1,011	1,438
From Thailand	37	66	170	527	975	1,438

Year
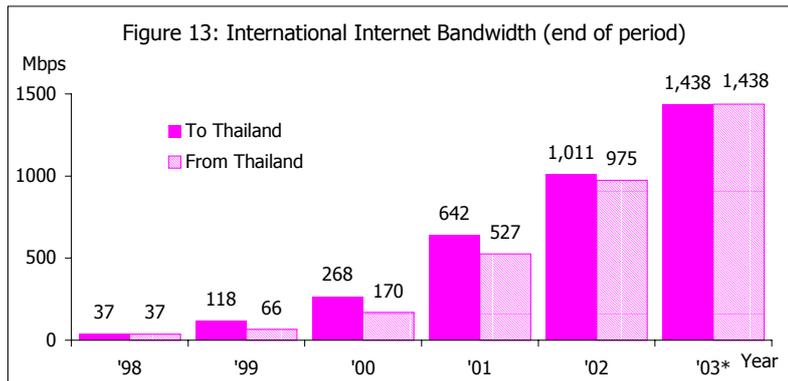
Source: NECTEC (*as of October 2003)

Remarks: The international Internet bandwidth represents the capacity of the communication lines of the ISPs. During 1999-2002, many ISP expanded their lines using "simplex" satellite service in order to cope with their congestions in the inbound traffic. In late 2002, most ISPs opt for high-quality fiber links and symmetric satellite services. This resulted in equality between the inbound and outbound capacities.

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Broadcasting

To measure the population's ability to gain access to audio and visual broadcasting technology, we use the household survey of the National Statistical Office that investigates households with TV sets and radio sets. Radio and television are traditional means for the publi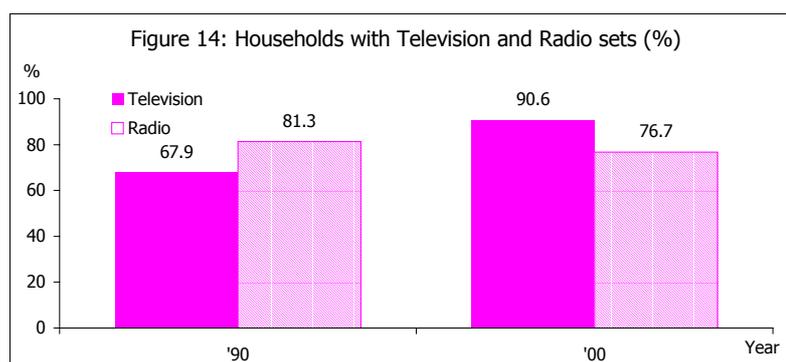c to gain information, and radio and television coverage is high, due to the relatively low cost of the equipment and the wide signal coverage. The drop in the households with radio sets with times is probably due to the substitution of affordable price television sets.

Table 2: Households with Television and Radio sets

	1980	1990	2000
Households with Television sets (%)	23.4	67.9	90.6
Northern Region	13.7	65.3	88.7
Central Region	30.6	80.8	92.8
Northeastern Region	7.7	53.5	89.6
Southern Region	13.9	67.9	87.2
Households with Radio sets (%)	95.0	81.3	76.7
Northern Region	94.7	80.6	77.2
Central Region	96.0	86.6	82.2
Northeastern Region	94.8	76.5	70.0
Southern Region	94.3	77.6	71.7

Source: NSO, http://www.nso.go.th/pop2000

Figure 14: Households with Television and Radio sets (%)

Source : NSO, http://www.nso.go.th/pop2000

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e-Commerce

E-commerce is an integral driver of the development of industrial and trade competitiveness and classified as an urgent national economic development strategy in the 2002-2006 ICT Master Plan. At present, there is relatively little interest in online purchasing among the Thai public, due to a lack of confidence in the quality guarantee of the goods and concerns about credit-card information.

To evaluate the potential of electronic commerce in Thailand, Internet Thailand PCL has evaluated the commercial revenues of its corporate customers using leased-line connections in 2001 and found that they are handling more than 1.5 trillion baht in revenue. This is 30% of the country's GDP (5 trillion baht). These companies are likely to develop electronic means to their business in the years to come.

To date, data on e-commerce in Thailand has only taken the form of predictions and assessments by the private sector, and the basis and methods of data collection and assessment have differed in accordance with the different theories and approaches employed by each organization. As a result, the information collected has been based on different hypotheses. The Electronic Commerce Resource Center (ECRC) at NECTEC has begun work on planned approaches to the development of systematic methods to assess the value of e-commerce as part of a survey of the domestic e-commerce situation and valuation of domestic e-commerce. This project is aimed at monitoring and assessing the overall e-commerce situation through annual surveys, the first of which was conducted in 2002. This survey is conducted by using as samples 300 large-scale businesses (50 B2B companies and 250 B2C companies) that conduct B2B and B2C e-commerce, with trade valued at 1 million baht or more. The results of this survey will provide a figure for the value of the nation's e-commerce, the framework of the business, and the type of goods that are popular for this method of commerce.

Figure 15: e-Commerce Value Transaction in 2002
Question: What is your estimated value of transaction processed via e-commerce or e-marketplace?

B2B
49,081 Mill.
(77%)

B2C
14,646 Mill.
(23%)

Total
63,727
Mill. Baht
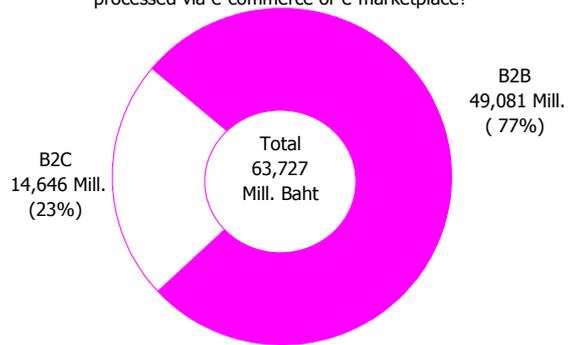
Source: ECRC/NECTEC
Base: A sample size of 40 e-Commerce key
players in Thailand

Figure 16: Internet Purchase Experience
Question: Did you do an online purchase?
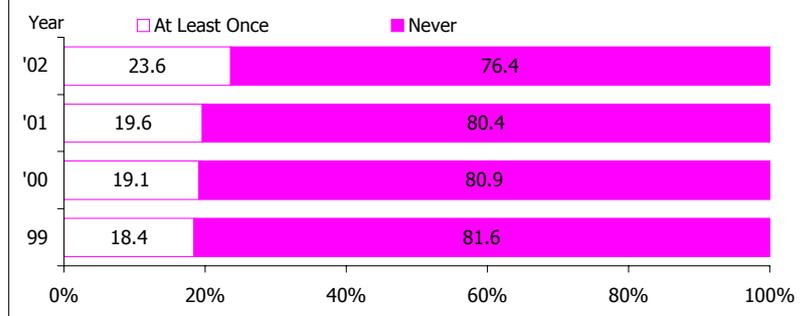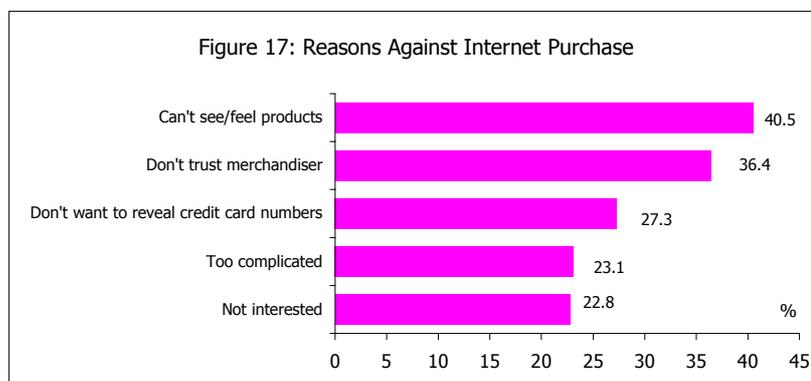
Year   □ At Least Once   ■ Never

Year	At Least Once	Never
'02	23.6	76.4
'01	19.6	80.4
'00	19.1	80.9
99	18.4	81.6

0%   20%   40%   60%   80%   100%

Source: Internet User Profile Survey, NECTEC, 2002

Figure 17: Reasons Against Internet Purchase

Reason	%
Can't see/feel products	40.5
Don't trust merchandiser	36.4
Don't want to reveal credit card numbers	27.3
Too complicated	23.1
Not interested	22.8

Source: Internet User Profile Survey, NECTEC, 2002

Figure 18: Goods and Services Purchased over the Internet

Item	%
Book	54.4
Software	21.9
Computer	18.9
Movie*	18.4
Reservation	16.1
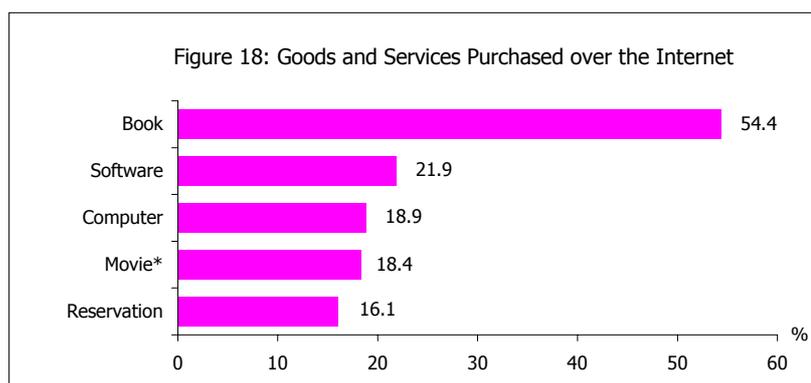
Source: Internet User Profile Survey, NECTEC, 2002
Remarks: Movie includes online movie and video cassette/ VCD/DVD sent via postal

Figure 19: Language Used in Thai
e-Commerce Web Site

Thai
27%

English
55%

Both
18%
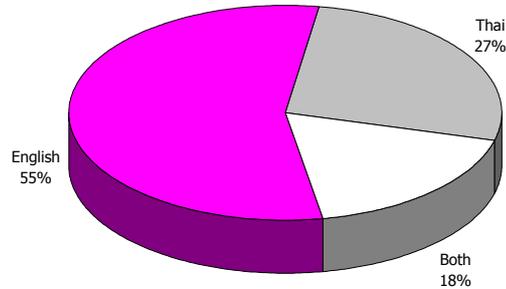
Source: e-Commerce Web Site Survey Project, NECTEC, 2001

Figure 20: Ordering Method in Thai
e-Commerce Web Site

Webform
69%

Shopping
Cart
31%
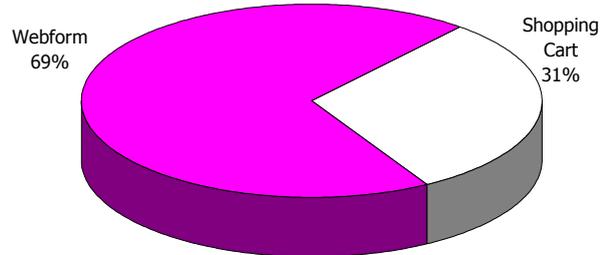
Source: e-Commerce Web Site Survey Project, NECTEC, 2001

Figure 21: Payment Method in e-Commerce Web Site*

Credit card	64.6
Bank Transfer	37.0
Cash on Delivery (COD)	21.4
Postal Service	15.1

%

0   10   20   30   40   50   60   70
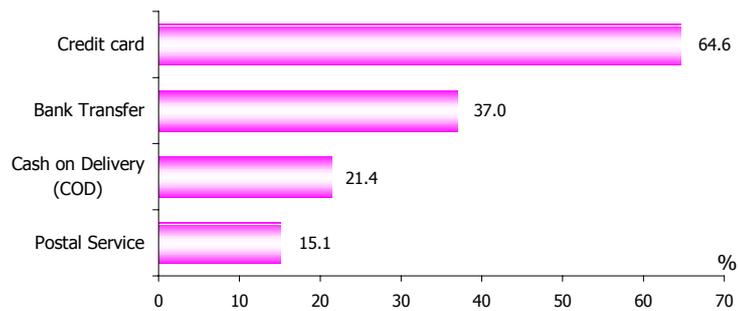
Source: e-Commerce Web Site Survey Project, NECTEC, 2001
Remarks: *Each web site can use more than one method of payment

Figure 22: e-Commerce Web Site by Industry
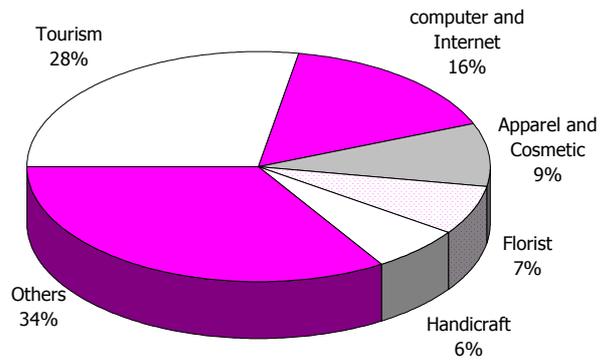
Source: e-Commerce Web Site Survey Project, NECTEC, 2001

Table 3: Internet Banking

	Year		
	2000	2001	2002
No. of agreements	21,102	97,101	254,989
No. of transactions	3,300,000	6,243,407	9,990,969
Value of transactions (Bill. Baht)	0.28	8.57	730.55

Source: BOT
Remarks: One agreement can generate more than one transaction.

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ICT Market and Industry

Thailand's IT market is steadily expanding, with state agencies, state enterprises, and the industrial sector representing major customers. The growth of the hardware market, in particular personal computers, continue to rise steadily. It is forecasted that the growth rate for this market will be around 15 percent[1] in 2003.

The software market, meanwhile, is expected to grow by approximately 23 percent. Most of the software is imported, as Thai software industry is still in an infancy stage. This is due to shortages of ICT h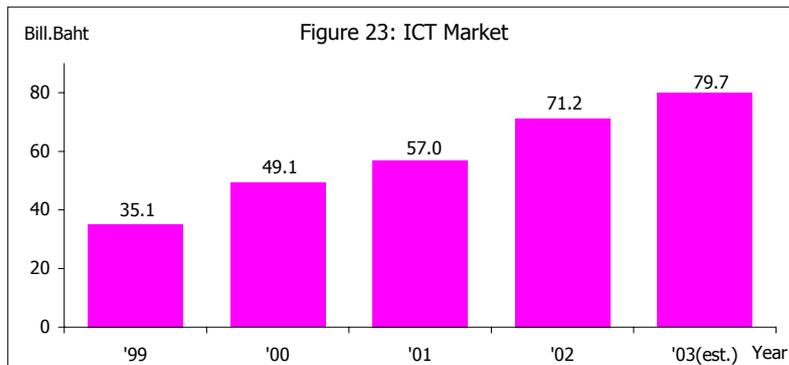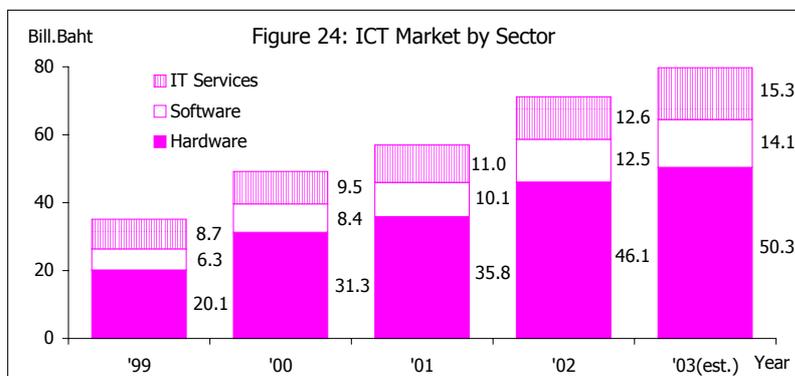uman resource as well as the problem of the software piracy. However, successful software companies are not selling just software; they bundle software services with the developed software systems. According to the Business Software Alliance (BSA), the piracy rate in Thailand is falling (from 82 percent in 1998 to 79 percent in 2000). In early 2001, Thai authorities imposed more stringent measures which ordered the public sector to use only legally licensed software. The policy also promoted the development and use of an open-source software.

As a result of the government's support for the use of ICT within the public sector, the demand for IT professional services is expected to increase. Consequently, this will lead to a significant growth in the software industry, training, IT professional services and systems maintenance.

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[1] From ICT Market Outlook, an annual report published jointly by three Thai ICT associations, namely the Association of Thai Computer Industries (ATCI), the Association of Thai Software Industry (ATSI) and the Information Networking Association (INA), in order to show the size of the market and the nation's industry situation. The information is taken from estimates drawn up by the country's major producers.

Figure 23: ICT Market

Bill.Baht

Year	Value
'99	35.1
'00	49.1
'01	57.0
'02	71.2
'03(est.)	79.7

Sources : ATCI, ATSI, INA

Figure 24: ICT Market by Sector

Bill.Baht

Legend:
- IT Services
- Software
- Hardware

Year	IT Services	Software	Hardware
'99	8.7	6.3	20.1
'00	9.5	8.4	31.3
'01	11.0	10.1	35.8
'02	12.6	12.5	46.1
'03(est.)	15.3	14.1	50.3

Sources : ATCI, ATSI, INA

Figure 25: Thailand Exports

Legend:
- Computer and Parts (Mill.US$)
- % of Total Exports

Year	Computer and Parts (Mill.US$)	% of Total Exports
'99	8.1	13.9
'00	8.7	12.6
'01	7.9	12.2
'02	7.5	10.8
'03*	4.4	11.0

Source: Ministry of Commerce
Remarks: as of July 2003

Table 4: ICT Market by Industry Segments

Million Baht	Year				
	1999	2000	2001	2002	2003(est.)
Total	35,137	49,139	56,953	71,153	79,720
Government/State Enterprise	7,379	8,845	9,682	11,384	12,755
Financial	3,162	3,440	3,987	5,692	7,175
Manufacturing	6,325	7,371	9,112	10,673	11,161
Health Care	703	491	570	1,423	2,392
Travelling/Hotel	351	491	1,139	2,135	1,594
Telecommunication	4,216	8,354	10,252	12,808	14,350
Education	3,865	7,862	9,112	10,673	11,958
Small Office & Home Uses	4,219	8,354	9,682	11,384	13,552
Other	4,919	3,931	3,417	4,981	4,783

Sources: ATCI, ATSI, INA

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ICT Human Resources

The most important factor that will enable ICT to drive economic and social development in the desired direction is the development of the quantity and quality of ICT personnel. Not only must there be sufficient numbers of skilled personnel, they must also be prepared to act as part of a global drive toward technology development. Furthermore, they must be able to apply this technology appropriately to the type of society in which they are operating. However, the rapid strides currently being made in IT have forced many countries to make urgent adjustments simply to keep up. This has led to an intense demand for IT personnel, both in terms of numbers and in terms of skills, with demand way outstripping supply. The inability to keep pace with these rapid changes will lead to loss of competitiveness and will have a negative impact on current and future economic and social-development projects.

According to the study done by NECTEC and Thammasat University[1], the demand for ICT personnel in year 2003 is estimated to be 106,992. However, problems remain in terms of the quality of the personnel. Specifically, there is a strong need for personnel with skills that matches the industry's demand.
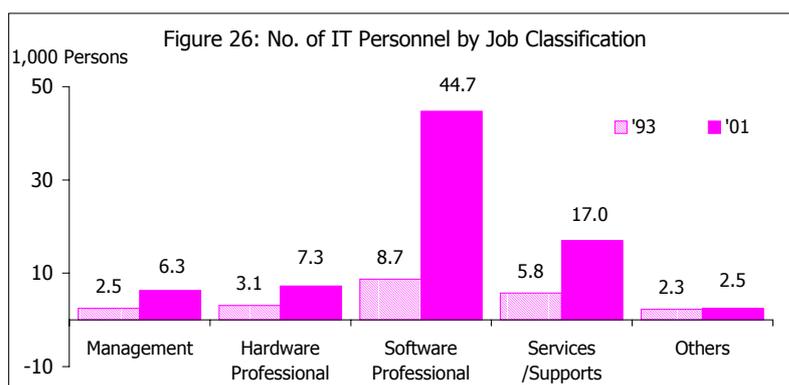
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[1] Puntasen, A. et al. (2001) The Demand for IT Manpower in Thailand, National Information Technology Committee Secretariat, National Electronics and Computer Technology Center, Bangkok (Thai).

Table 5: Enrollment Rates*

	Year			
	1999	2000	2001	2002
Pre-primary	96.2	95.7	93.1	90.6
Primary	102.3	103.2	103.8	104.8
Lower secondary	83.4	82.8	82.2	82.2
General upper secondary	33.2	36.7	38.9	38.8
Vocational upper secondary	22.1	20.7	20.4	21.3

Sources: Office of the National Education Commission, Thailand Education Statistics
Report 1996 - 2000, Thailand Education Data 2001 and Bureau of Educational Research
and Development.
Remarks : * Gross Enrollment
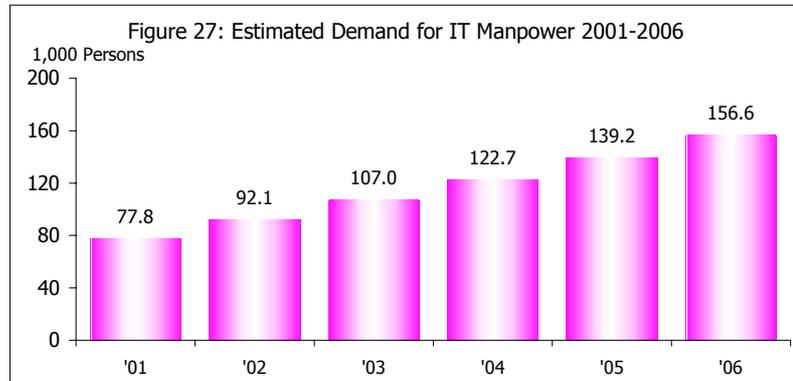
Figure 26: No. of IT Personnel by Job Classification

Source: The Demand for IT Manpower in Thailand, NECTEC, 2001

Figure 27: Estimated Demand for IT Manpower 2001-2006

1,000 Persons

Year	Value
'01	77.8
'02	92.1
'03	107.0
'04	122.7
'05	139.2
'06	156.6

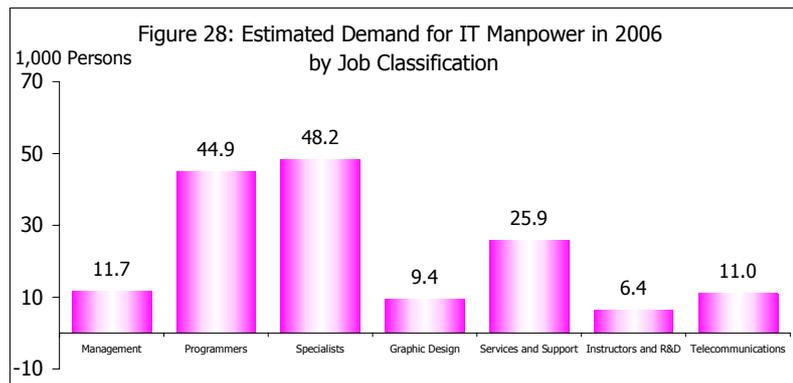Source: The Demand for IT Manpower in Thailand, NECTEC, 2001

Figure 28: Estimated Demand for IT Manpower in 2006 by Job Classification

1,000 Persons

Job Classification	Value
Management	11.7
Programmers	44.9
Specialists	48.2
Graphic Design	9.4
Services and Support	25.9
Instructors and R&D	6.4
Telecommunications	11.0

Source: The Demand for IT Manpower in Thailand, NECTEC, 2001
Remarks : Specialists = Data Communications Specialist, Database Specialist, IT Security Specialist, Quality Assurance Specialist, Information Audit Specialist, System Software Support Specialist, Distributed System Specialist and System Integration Specialist

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ICT in Government Sector

E-government is a new form of government administration, the one that uses computer technology and communication networks to provide better services to business and citizen. It also boosts the efficiency of government operations as well as enhancing good governance and transparency.

ICT can serve as a tool to leapfrogging the country's development into a knowledge-based society. At the same time, the use of Internet as an electronic means for public service provision allows the citizen to get closer to the government, and the government can enhance its relationship with the citizen.

The targets for Thailand e-government are based on the following principles: redtape-reduction, rapid-response, rural-coverage, round the clock (24x7), equality and transparency.

The e-government project, jointly implementing by the Ministry of ICT and NECTEC, has developed a system to monitor readiness for e-government development, called Service E-Readiness Explorer, or SEE. The SEE system is composed of subsidiary systems: a system for the integration and monitoring of ICT operational plans; a system to survey and monitor progress in the development of electronic services like automatic website survey; and an interactive program to monitor progress.

In terms of ICT usage within the public sector, it was found that the government's IT budget has risen continually, with an emphasis for the most part on the development of government-service systems. This accords with the seventh strategy laid out in the national ICT Master Plan.

Today, 99.6 percent of government agencies have their own websites.
However, most of those websites only provide initial information, but very
few interactive services for the public.
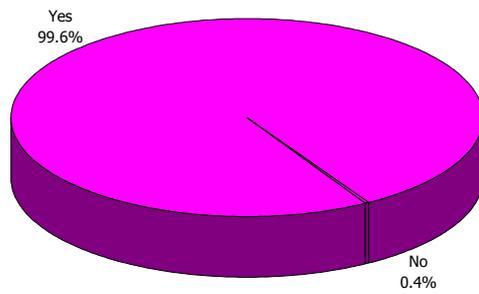
Figure 29: Government IT Budget*
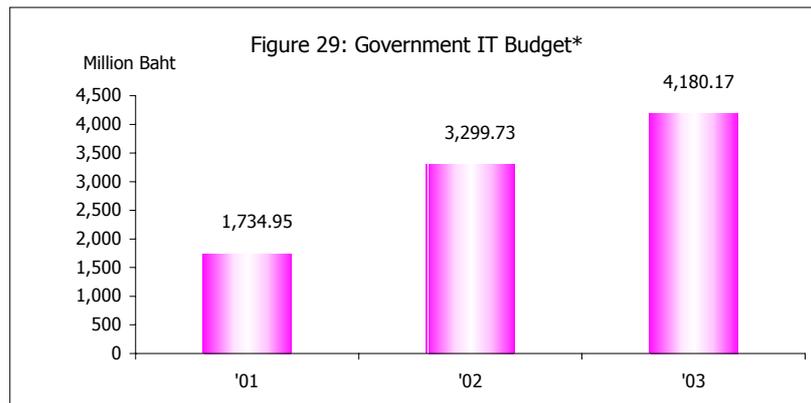
Source: The Bureau of the Budget
Remarks: * Software and Training Budget Excluded

Table 6: Government Budget by Strategy of ICT Master Plan (in million baht)

Strategy	Year	
	2002	2003
1. The development of the ICT industry into a regional leader	994.75	376.72
2. The utilization of ICT to enhance the quality of life and society	16,410.09	15,607.82
3. Reform and enhancement of capability on ICT R & D	1,216.93	372.63
4. Social capacity leverage for the future competition	456.76	2,320.56
5. Development of entrepreneur capacity for the expansion of international markets	104.84	87.85
6. The utilization of ICT in SMEs	139.26	153.24
7. The utilization of ICT in government administration and services	12,281.42	23,783.20

Source : http://see.thaigov.net/actionplan, as of 22 September 2003.

Figure 30: Government Agencies with Website

Yes
99.6%

No
0.4%

Source : http://see.thaigov.net/email-list, e-Government Project, NECTEC, May 2003.

Figure 31: Government Agencies e-Mail Usage

Yes
76%

No
24%
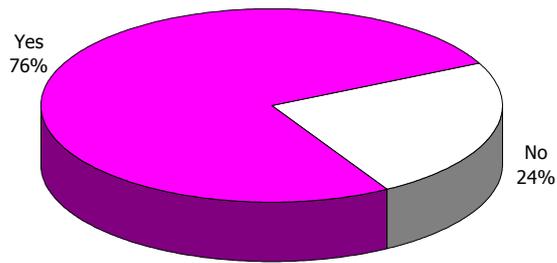
Source : http://see.thaigov.net/email-list, e-Government Project, NECTEC, May 2003.

Figure 32: Government Agencies Webboard Usage

No
55.6%

Yes
44.4%
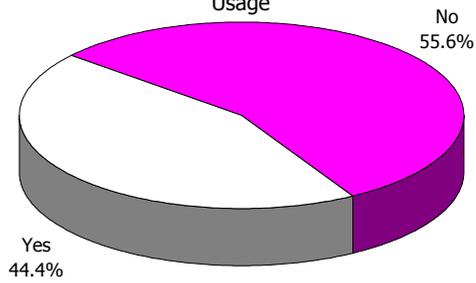
Source : http://see.thaigov.net/email-list, e-Government Project, NECTEC, May 2003.

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Regulatory Framework

ICT has come to play an integral role in our day-to-day lives. Not only does this technology lead to our daily activities taking on new forms, it also leads to social change. As a result, new social regulations are needed in order to keep up with changes. In this regards, Thailand has responded to these changes, as evidenced by the fact that in recent years the government has been working on many important pieces of legislation to respond to new forms of business that have resulted from the use of ICT. Presently, these laws are in different stages of development.

Table 7 : Thailand Information Technology Laws

Communication and Telecommunication laws	
1.	The Organization of Frequency Wave Allocation and Supervision of Radio Broadcasting, Television Act. B.E 2477 (1934)
2.	Telegraph Organization of Thailand Act B.E 2477 (1934)
3.	The Telephone Organization of Thailand Act B.E. 2497 (1954)
4.	The Radio Communication Act, B. E. 2498 (1955)
5.	The Radio Communications and Broadcasting Act B.E. 2498 (1955)
6.	The Communications Authority of Thailand Act B.E. 2519 (1976)
7.	Protection for Operation of the Telecommunication Organization of Southeast Asia Act B.E. 2522 (1979)
8.	Protection for Operation of International Telecommunication Satellite Organization Act B.E.2524 (1981)
9.	Telecommunication Business Operation Act B.E. 2544 (2001)
Information Technology Laws	
1.	The Electronic Transactions Act, B.E. 2544 (2001)[1]
3.	The Information Infrastructure Bill, B.E. ….[2]
4.	The Data Protection Bill (draft)[3]
5.	The Computer Crime Bill (draft) [4]
6.	The Electronic Funds Transfer Bill (draft) [5]

Laws Related to Computer Industry and Computer Business	
1.	Patent Act, B.E. 2522 (1979)
2.	Royal Decree for Providing Conditions for the Protection of International Copyright, B.E.2536 (1993)
3.	Copyright Act, B.E. 2537 (1994)

Source: The National Electronics and Computer Technology Center

Remarks:
1. This act comprises of two draft laws: The Electronic Transactions Bill and The Electronic Signature Bill. This act was published in the Royal Gazette on December 4, 2001
2. This draft law was approved by the Cabinet on November 7, 2000. It underwent review by the Council of State during April-August 2001. It is in the process of the Cabinet for endorsement before going to parliament.
3. This draft law was approved by the National Information Technology Committee (NITC) on October 3, 2001 and has been submitted for the Cabinet for endorsement.
4. This draft law been approved by the National Information Technology Committee (NITC) on May 2, 2002 and has been submitted for the Cabinet for endorsement.
5. This law is in the drafting process.

R&D and Patents

Research and Development (R&D)

Knowledge gained from research and development, in particular in the field of science and technology, remains the mainstay of strong and sustainable social and economic development.   In Thailand, "A Survey of R&D Expenditures and Personnel in Thailand" in 1999, conducted by the Policy and Planning Division of the National Research Council, showed that in 1999, Thailand's R&D expenditures was approximately equivalent to a mere 0.12 percent of GDP. Investment in R&D is for the most part by the public rather than the private sector. The 9th National Economic and Social Development Plan (2002-06) aims to boost Thailand's R&D work, with R&D expenditures by both the public and the private sectors targeted at 0.4 percent of GDP.

The 1999 survey of R&D expenditures and personnel showed that in 1996, expenditures on R&D in ICT totaled more than 280 million baht. This relatively high level can be attributed to the fact that 1996 was the year in which computing and Internet Technology began to play a role in boosting work efficiency. As a result, both public- and private-sector agencies began to take a growing interest in investing in R&D in computers and IT. However, 1997 was marked by a significant drop in ICT R&D, due to the impact of the Asian economic crisis. The higher-education sector is the sole sector for which the trends point to continuous growth in R&D in these fields.

Patents

International organizations like the World Bank and UNDP use patents as an indicator of the scientific and technological development of a country, because patents point to new inventions. The details of these inventions, in turn, point to thought processes stemming from research and development. Patents are sources of information about technological knowledge that can be used to upgrade production and quality.

The protection offered by patents provides encouragement for inventors to continue thinking up new ideas and create new inventions. By offering patents, inventors are assured that their ideas will not be copied. At the same time, inventors must disclose the important details of their inventions in exchange for patent protection. The disclosure of details of inventions allows inventors to conduct further studies and research & development and leads to further technological advancement. Furthermore, the provision of protection helps attract foreign investment in a variety of industrial sectors.

In order to draw up indicators of ICT patents, NECTEC gathered and screened over 9,000 lists of patent information from the website of the Department of Intellectual Property, Ministry of Commerce (http://www.ipic.moc.go.th), by focusing on categories of physics and electricity. The Organisation for Economic Cooperation and Development's (OECD's) definition of the ICT sector1 has been employed to classify and select ICT-related patent.

It was founded that from 1980-2002, a total of 3,471 patents were applied for, of which 70 belonged to Thai nationals and 3,401 to foreigners. During 1980-2003, a total of 441 patents were granted, 6 to Thais and 435 to foreigners. And during 1999-2002, a total of 132 petty patents were granted (to both Thais and foreigners) in the areas of physics and electricity, of which 21 were of ICT related.
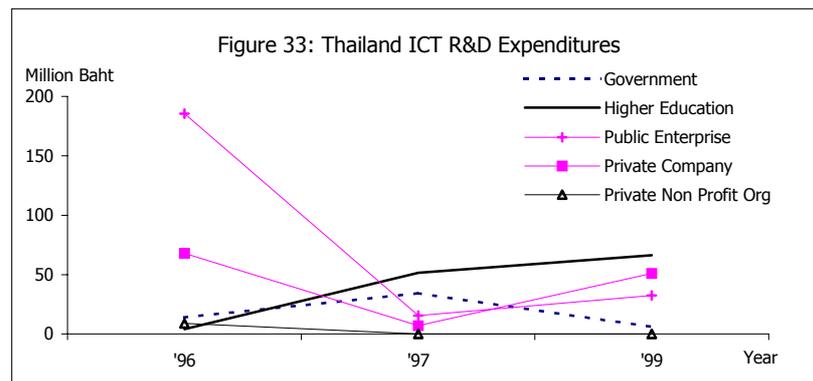
Figure 33: Thailand ICT R&D Expenditures

Source : Research Policy and Planing Division, National Research Council of Thailand.

Table 8:Thailand R&D Expenditures on ICT (Baht)

Sector	Year		
	1996	1997	1999
Government	13,971,817	34,475,062	5,983,915
Higher Education	4,141,566	51,459,362	66,263,798
Public Enterprise	185,415,611	15,440,991	32,567,776
Private Company	67,954,862	7,118,000	51,076,815
Private Non Profit Org	8,934,088	-	-
Total	280,417,944	108,493,415	155,892,304

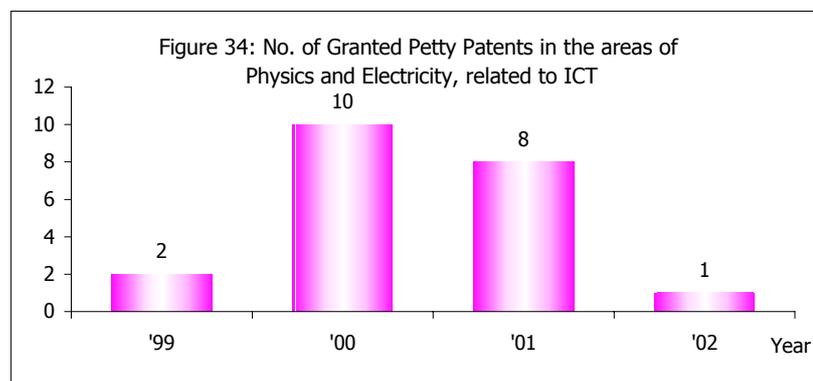Source: Research Policy and Planing Division, National Research Council of Thailand.

Table 9: ICT Related Patents Filed and Granted in Thailand

	Year						
	1997	1998	1999	2000	2001	2002	2003*
Proposals filed	511	368	287	290	193	42	N/A
- Foreigner	505	354	274	282	187	42	N/A
- Thai	6	14	13	8	6	-	-
Granted**	75	85	14	17	46	48	1
- Foreigner	74	84	14	16	45	48	1
- Thai	1	1	-	1	1	-	-

Source: MOC, http://www.ipic.moc.go.th
Remarks: * as of June 2003
   **The granting process may take more than 1 year, hence the number for proposals
    filed and granted for each year might not be related.

Figure 34: No. of Granted Petty Patents in the areas of Physics and Electricity, related to ICT

Source: MOC, http://www.ipic.moc.go.th

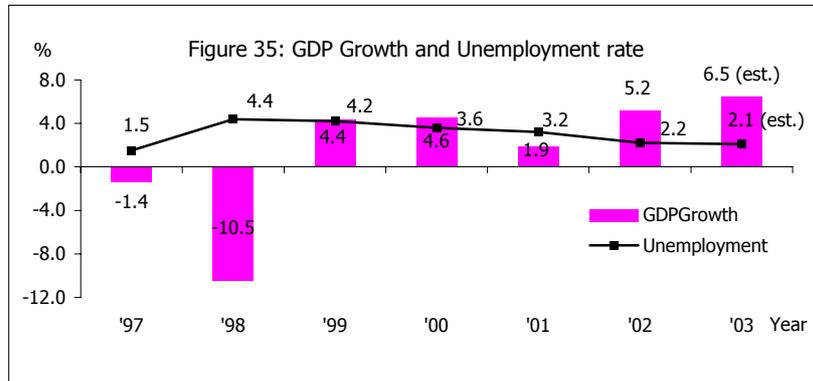(หน้าว่าง)

Additional Data: General Economic Information

Macroeconomic indicators are one factor that can point to a country's economic environment and imply the national economic policies.
In Thailand, several indicators point to a revival of the economy from its former slump, whether in terms of economic growth, a reduction in unemployment, or the increasingly stable currency.

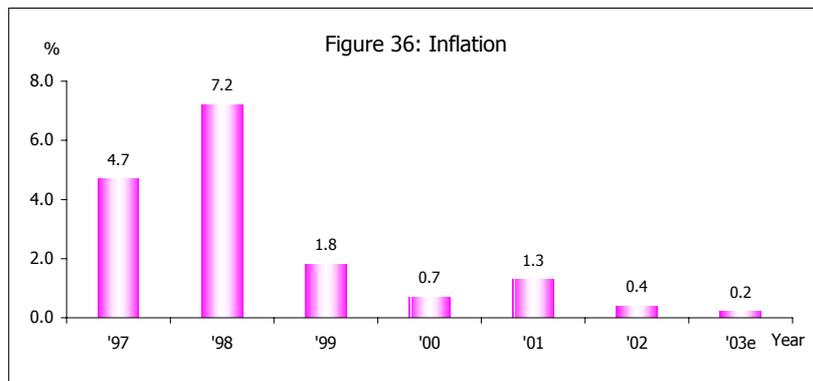Table 10: General Economic Information

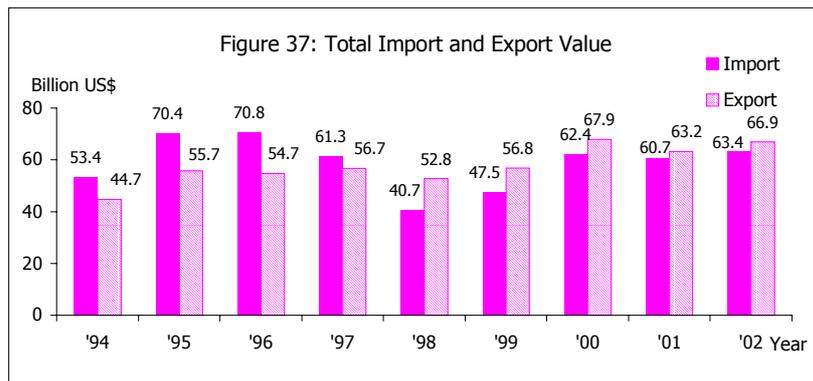|	Year					
	1997	1998	1999	2000	2001	2002
Population (Million)	60.82	61.47	61.66	61.88	62.31	62.80
Unemployment rate	1.5	4.4	4.2	3.6	3.2	2.2
Real GDP growth (%)	-1.4	-10.5	4.4	4.6	1.9	5.2
GDP at current prices (Bill. Baht)	4,733	4,626	4,637	4,916	5,123	5,430
Exports (Bill. Baht)	1,789.8	2,181.1	2,150.0	2,730.9	2,807.9	2,871.5
- as % of GDP	37.8	47.1	46.4	55.6	54.8	52.9
Imports (Bill. Baht)	1,874.6	1,678.0	1,800.1	2,513.5	2,695.6	2,722.7
- as % of GDP	39.6	36.3	38.8	51.1	52.6	50.1
Trade balance (Bill. Baht)	-84.8	503.1	349.9	217.4	112.3	148.6
- as % of GDP	-1.8	10.9	7.5	4.4	2.2	2.7
Current A/C (Bill. Baht)	-40.2	592.2	470.0	371.5	276.1	328.5
- as % of GDP	-0.8	12.8	10.1	7.6	5.4	6.0
Balance of payments (Bill. Baht)	-299.2	57.6	172.7	-58.4	57.6	180.8
Baht/US$ (Selling rate)	31.48	41.58	37.95	40.26	44.58	43.11
SET index (Close)	372.7	355.8	481.9	269.2	303.9	356.5
Market cap.* (Bill baht)	1,133.3	1,268.2	2,193.1	1,279.2	1,607.3	1,986.2
- as % of GDP	24.0	27.4	47.3	26.0	31.4	36.6

Source: NESDB, BOT, MOC, SET

Remarks: * As of September 2003, the market capital of Thai Stock Market was well over
2,600 billion baht.

Figure 35: GDP Growth and Unemployment rate

%

	'97	'98	'99	'00	'01	'02	'03
GDP Growth	-1.4	-10.5	4.4	4.6	1.9	5.2	6.5 (est.)
Unemployment	1.5	4.4	4.2	3.6	3.2	2.2	2.1 (est.)

■ GDPGrowth
■— Unemployment

Year

Source : NESDB

Figure 36: Inflation

%

Year	'97	'98	'99	'00	'01	'02	'03e
Inflation	4.7	7.2	1.8	0.7	1.3	0.4	0.2

Year

Source : NESDB

Figure 37: Total Import and Export Value

Billion US$

■ Import
▨ Export

Year	'94	'95	'96	'97	'98	'99	'00	'01	'02
Import	53.4	70.4	70.8	61.3	40.7	47.5	62.4	60.7	63.4
Export	44.7	55.7	54.7	56.7	52.8	56.8	67.9	63.2	66.9

Year

Source : MOC

Table 11: Export of Manufacturing Products (Million Baht)

Type of Products	Year							
	1995	1996	1997	1998	1999	2000	2001	2002
Main Export Categories								
Labor Intensive Products	271.1	228.7	259.0	303.6	287.6	325.5	356.5	340.3
(% of Total Export)	19.3	16.2	14.3	13.5	13.0	11.7	12.3	11.5
Hi-Technology Products	658.9	697.5	947.8	1,228.2	1,259.6	1,686.3	1,692.3	1,753.9
(% of Total Export)	46.9	49.4	52.5	54.7	56.9	60.8	58.5	59.5
Resource-Based Products	128.5	135.1	163.0	194.3	198.7	223.1	247.0	251.6
(% of Total Export)	9.1	9.6	9.0	8.6	9.0	8.0	8.5	8.5

Source: BOT

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List of Abbreviations

ATCI	The Association of Thai Computer Industry
ATSI	The Association of Thai Software Industry
B.E.	Budhist Era
BOT	Bank of Thailand
CAT	Communications Authority of Thailand (Now split to CAT-Telecom Plc., and Thai-Post Co., Ltd.)
ECRC	The Electronic Commerce Resource Center, NECTEC
INA	The Information Networking Association
ISP Club	Internet Service Provider Club
MOC	Ministry of Commerce
NECTEC	National Electronics and Computer Technology Center
NESDB	National Economic and Social Development Board
NSO	National Statistical Office, Ministry of Information and Communications Technology
SET	Stock Exchange of Thailand
THNIC	Thailand Network Information Center (T.H. NIC Co., Ltd.)
TOT	Telephone Organization of Thailand (now TOT Corporation Plc.)
UNDP	United Nations Development Programme