Chapter 7 Toward A Knowledge-Based Economy: Southern Thailand

Chapter 7

TOWARD A KNOWLEDGE-BASED ECONOMY: SOUTHERN THAILAND

Minoru Makishima

1. INTRODUCTION

Since the mid-1990s, the Thai Government, along with neighbouring countries, has been paying attention to the strategic importance of information and communication technology. Under the IT-2000 project (1996-2000), the Government tried to accelerate the computerization of Thailand in three ways: Nationwide establishment of an information infrastructure, good governance and human-resource development. Attempts were made to incorporate both computers and the Internet into the education curricula and set up e-government in cooperation with governmental institutions. As for the non-government sector, a legal infrastructure for promoting e-commerce has been accelerated. However, the main obstacle to the dissemination of ICT is the imbalances in information infrastructure that exist between Bangkok and regional areas. One of these imbalances is in the distribution of telephones: All regions combined have only one fifth of the number of telephones found in Bangkok, and this is one reason why the Internet is not yet widely used in local areas.

As for the IT-2000 project, the Thai Government has not advocated a nationwide initiative for a knowledge-based economy as strongly as Singapore or Malaysia; and Thailand still suffers from the effects of the economic crisis that began in 1997, though there are several signs of recovery. As a result, Thailand has lagged behind both countries in terms of computerization. Medium-term projects preceding the IT-2010 programme (2001-2010) include laying down telephone lines in villages nationwide by the year 2005 and introducing a broadband network by 2006. The Government's IT programme can be described as a response to correct the digital divide engendered by globalization and the uneven development of ICT.

Due to these circumstances, this chapter will focus on regional development and development strategies toward a KBE in southern Thailand. First, it takes a look at the geographic conditions and economic structure of the South and discusses human-resource development for ICT and the role of higher education. Next, the formation of the industrial cluster and trade development with neighbouring countries is examined. Finally, it focuses on the Greater Phuket Digital Paradise Project as one example of an ICT development strategy and examines plans for future economic development in the South.

2. PROFILE OF SOUTHERN THAILAND

2.1 Geography

The shape of southern Thailand is long and narrow, stretching north to south approximately 750 km. It covers an area of 70,700 sq km, which is equivalent to 13.3 percent of the total land area of the country. It consists of 14 provinces and is geographically divided into the following three areas:

(1) The Upper South covers Chumporn and Ranong provinces, which are adjacent to the southern part of Prachuab Khiri Khan province. This provincial area is the major industrial iron base of the country. Ranong is also a gateway for investment to neighbouring countries, such as Myanmar, Bangladesh and the eastern part of India.

(2) The Central South covers Surat Thani, Nakhorn si Thammarat, Phuket, Phangnga, Krabi, Trang and Phattalung provinces. In this area, Phuket, Phangnga, Krabi and Samui Island are known worldwide as attractive maritime tourist destinations, while the economies of Surat Thani, Nakorn si Thammarat, Trang and Phattalung are based on the agriculture and agri-processing industries.

(3) The border provinces of the Lower South are Satun, Songkhla, Yala, Pattani and Narathiwat. These provinces are important strategic areas for economic and social development as well as for the national security of southern Thailand. Different from the other southern provinces in respect to region and culture, the southern-most

provinces are closely linked to Malaysia both economically and socially. The Upper South and the Central South are interconnected in respect to the transportation network, agricultural industry, tourism and natural resource and environmental development. The five southern-most border provinces have different features from those farther north, and their development should be considered from the viewpoint of their relationship with neighbouring countries and the global economy.

2.2 Major Cities in the South

As for major cities, Surat Thani has developed as an industrial centre of the Upper South. Farther south, Hat Yai is a centre of business, commerce and transportation and has the function of interconnecting border-trading points, including Sadao, Padangbesar, Satun, Betong and Sungai-Kolok; Songkhla is a port city and an administrative centre. As for the western area, Phuket, located on the Andaman Sea, is a port city and is being promoted as an international centre of transportation and tourism. Phuket is also expected to be a centre of ICT-based industry.

2.3 Population and Workforce

By the end of 2000, the population of the South was approximately 8.4 million, or 13.5 percent of the country's total population. The South's population is mostly composed of people aged 15 to 59. The workforce amounts to about 70 percent of the total regional population, which may be a positive factor for future production activity and development (see Table 2.1).

Approximately 50 percent of the current workforce belongs to the agricultural sector. In the South, the work force of the industrial sector is not the majority. In fact, the non-agricultural workforce of the commercial, services and handicraft-industrial sectors cover only 15.4 percent, 15.1 percent and 9.1 percent, respectively. As Table 2.2 shows, the proportion of the factories in the South to the whole country was only 8.35 percent in 2001. As for the workforce, it is only 6.14 percent of the whole country.

The majority of the population inhabits the eastern provinces, which amounts to more than three times the population inhabiting the western provinces. The population of three provinces accounts for 44.5 percent of the regional population as follows: Nakhorn si Thammarat with 18.6 percent and is the most populated province while Songkhla and Surat Thani contain 15 percent and 10.9 percent, respectively.

2.4 Economic Structure of the South

As Table 3 indicates, the agricultural sector is crucial to the South because the majority of the workforce is still engaged in this sector. The agricultural sector has been steadily increasing during recent years; its share of total gross regional product was 69.4 percent in 2000, while the non-agricultural sector's GRP was 30.6 percent. The agricultural sector percentage of GRP in the South is the highest in the country. Due to the climate and existing development policy as the supporting criteria, agricultural production has grown about 4 percent on average per year. In the agricultural sector, plantation products, particularly rubber, oil palm and fruit plants, comprise a share of 54.9 percent, and fishery represents a share of 28 percent. The fishery sector is important in the South but is subject to problems, such as export decreases or the lack of raw materials.

The second largest sector is services, which contributes 18.39 percent. The wholesale and retail trade sector ranks third with a contribution to GRP of 13.61 percent.

As for the manufacturing sector, its share is quite low compared to the overall national industrial sector, which is 32 percent of GDP. The workforce of the industrial sector in the South is only 2.67 percent. However, the industrial sector has gradually become more crucial to the southern economy. The major industry in the South is resource-based industry, such as frozen and canned seafood and rubber and oil palm refining. Agri-based industry with added value is promising for expanding the export operations. In the case of the rubber industry, its success depends on the international market, which can easily have a negative affect on production. As for the mining sector, its share of GRP is only 2.26 percent, although the South has abundant industrial minerals.

In summary, the economic structure of the South depends primarily upon the agricultural sector. Resource-based industry is needed to enforce research and development activities for added value in order to achieve international competitiveness. Moreover, the development of an industrial zone will be needed to support industrial activities and promote investment.

Gross Regional Product

The gross regional product at current market prices in the South increased about 1.5 times for the period of 1993 (35.345 million baht) to 2000 (53.794 million baht) (see Table 2.3).

GRP in the South ranked fourth in the country in 2000. It is approximately one fifth of Metropolitan Bangkok's GRP.

As Table 2.4 shows, among the provinces of the South, Songkhla contributed the highest proportion of gross provincial product (GPP) at 18.25 million baht in 2000. Following Songkhla in a ranking of GPP are Nakhorn si Thammarat (16.38 million baht), Surat Thani (11.61 million baht) and Phuket (10.2 million baht).

The GPP of the four southern border provinces of Satun, Tala, Narathiwat and Patun is comparatively lower in the region because they depend upon the agricultural sector. The total GPP for these provinces in 2000 was almost the same as Songkhla, which is also included in the southern-border region.

Per Capita Income

As Table 2.5 presents, the average per capita income in the South increased from 35,311 baht in 1993 to 53,762 baht in 2000. The average per capita income in the South ranked fifth, next to the West, in the country in 2000. The South has approximately one fourth of the per capita income of Metropolitan Bangkok, where it is 208,540 baht.

Of the southern provinces, Phuket had the highest per capita income; in 2000, it was 227,505 baht. The minimum wage in Phuket is the highest in the country (173 baht per day, as of February 2002). As well, the average income in Phuket is very high.

Ranong ranked second in per capita income at 92,486 baht in 2000. A major portion of Ranong's income comes from the services sector, such as the

tourism industry. As Table 2.6 shows, the lowest average per capita income in the region was 28,687 baht (in 2000) in Phattalung in the Lower South. These figures indicate that a remarkable imbalance of income exists among provinces in the South.

2.5 Energy

Southern Thailand is rich in energy resources. Exploration for fuels, such as raw oil and natural gas, began in the Gulf of Thailand in 1973. It is called the "Gulf of Thailand natural gas area" and has been developed to build resource bases for the country's energy security and development.

Abundant mineral resources, such as coal in the district of Sabayoi in Songkhla, have been discovered but not yet developed. The coastline, which extends into Malaysia, is also expected to be developed for its abundant natural gas and raw oil resources.

Natural gas in the Gulf of Thailand is distilled as cooking gas (LPG) at a rate of 650 tonnes per day at Kanom in Nakhorn si Thammarat. Geographically, these natural gases are found in the southern coastal areas, approximately 200 km from the shore. Environmental preservation is required in the extraction of the energy resources.

2.6 Tourism

The tourism industry has been quite important as a services sector in the South. The best-known tourist sites are Phuket, Krabi and Samui Island, which have hosted millions of foreign visitors. Recently, eco-tourism has attracted attention by combining sightseeing and preservation of the environment.

Hat Yai, close to the border with Malaysia, has many tourists visiting for shopping and entertainment. Most of these tourists come from Malaysia and Singapore.

The tourism industry has significantly grown, even during the period of economic crisis that first hit in 1997. The number of foreign visitors that pass through the immigration checkpoints of the South has increased to 2.2 million.

2.7 Financial Sector

Most financial institutions are branch offices that are headquartered in Bangkok. At present, there are 12 major financial institutions: commercial banks, Government Savings Bank, financial companies, Bank for Agriculture and Agricultural Cooperatives (BAAC), the Industrial Financial Corporation of Thailand (IFCT), pawnshops, savings cooperatives, Government Housing Bank (GHB), an export-import bank (EXIM Bank) and credit offices. There is only one institution that has its headquarters located in the South.

The most important financial institutions in the South are the commercial banks. They have grown quickly, expanded their branch offices and have been collecting deposits and credits from the local economy. As of the end of 2001, the number of commercial bank branches in the South totalled 410. There are 78 commercial bank branches located in Songkhla, which is the largest concentration in the South. Following are Surat Thani and Nakhorn si Thammarat, with 58 and 54 branches, respectively.

As for the deposit structure, 63 percent is fixed deposit; the rest is savings and current deposit, with 34 percent and 29 percent, respectively.

The finance market flow has been moving more toward investments, especially stock investments, which grew significantly from 1991-1993 because of the decreasing interest on deposits provided by commercial banks. Financial and stock exchange firms have grown and are highly competitive in efforts to acquire customers by providing immediate and appropriate information. E-commerce is growing in use, especially in the financial sector to participate in the emerging knowledge-based economy.

Table 2.1: The Labour Structure of Southern Thailand

	1996[1*]	1997[1*]	1998[1*]	1999[1*]	2000[1*]	2001[2]
Overall population	7,968,444	8,068,942	8,164,846	8,259,151	8,347,448	8,433,416
Population older than 13	5,728,783	5,835,781	5,904,683	5,992,687	6,083,382	5,833,708
Population older than 15						
Percentage of population	71.89	72.32	72.32	72.56	72.88	69.17
Labour force	4,034,910	4,120,603	4,144,419	4,217,807	4,214,171	4,345,974
Percentage of population	50.64	51.07	50.76	51.07	50.48	51.53
Employed	3,979,572	4,063,628	4,039,700	4,116,970	4,127,460	4,252,811
Percentage of labour	98.63	98.62	97.47	97.61	97.94	97.86
- Agriculture	2,238,836	2,235,544	2,166,342	2,192,224	2,142,407	2,137,461
Percentage of employed	56.26	55.01	53.63	53.25	51.91	50.26
- Non-agriculture	1,740,735	1,828,084	1,873,358	1,924,745	1,985,053	2,115,348
Percentage of employed	43.74	44.99	46.37	46.75	48.09	49.74
- Educated	3,451,681	3,800,948	3,797,817	3,871,011	3,909,719	4,029,421
Percentage of employed	86.73	93.54	94.01	94.03	94.72	94.75
- Uneducated	258,466	262,581	241,381	245,959	217,740	215,042
Percentage of employed	6.49	6.46	5.98	5.97	5.28	5.06
Unemployed	46,283	53,754	103,956	87,221	81,292	91,278
Ratio of unemployed	1.15	1.30	2.51	2.07	1.93	2.10
Seasonal unemployed	9,055	3,221	763	13,616	5,419	1,886
Non-labour force	1,693,873	1,715,178	1,760,264	1,774,880	1,869,211	1,487,734
Percentage of population	21.26	21.26	21.56	21.49	22.39	17.64
Population younger than 13	2,239,661	2,233,162	2,260,163	2,266,464	2,264,064	2,599,708
Population younger than 15						
Percentage of population	28.11	27.68	27.68	27.44	27.12	30.83
Ratio of labour force inflowing	70.43	70.61	70.19	70.38	69.27	74.50

Source: Provincial Labour Study Project

Edited by: NESDB Southern Development Centre August 3, 1996- 2000: Quarter 3 2001 (as of July 2002)

The National Statistics Office

Note: [1]* The detail in 1996-2000 was investigated in August.

[2] The detail in 2001 was investigated for only three months: July – September

[3] In 2001, the labour age changed from a minimum of 13 years to 15 years in accordance with a new child labour law.

Table 2.2: Factory, Capital and Labour by Industry in 2001

Industrial sector	Number of		Factory Capital		Labor	
	Number	%	Million Baht	%	Person	%
Food Products	4,331	0.63	25,054.31	5.08	57,852	0.71
Beverage industry	35	0.00	2,183.91	0.00	1,907	0.00
Textile, dress, leather good	16	0.00	177.38	0.00	351	0.00
Dress (except shoe)	4	0.00	43.67	0.00	415	0.00
Leather product, fur, shoe,dress	9	0.00	147.97	0.00	564	0.00
Wood products	980	4.93	15,878.97	2.49	32,067	4.78
Furniture and decoration	285	2.15	1,519.235	2.36	6,646	2.45
Paper and Paper products	18	5.88	708.14	0.11	217	4.83
Printing, advertising and publishing	78	1.30	608.33	2.24	742	4.65
Chemicals product	44	2.33	2,393.78	0.04	727	1.11
Petroleum refinery	56	12.00	1,398.54	12.26	951	4.97
Rubber and plastic	695	1.76	22,513.21	8.60	44,207	5.88
Non-metallic	1,087	1.40	9,760.50	1.44	14,928	1.71
Iron and steel industry	21	5.00	961.06	0.02	501	1.01
Metal products	602	2.38	1,832.51	0.50	4,298	1.37
Machinery	537	0.56	1,681.68	0.20	3,414	0.44
Electrical equipment, electrical appliances	37	0.00	262.86	0.00	1,184	0.00
Transprotation equipment	914	1.78	4,716.96	7.03	7,701	2.28
Mining	1,221	3.39	3,481.71	1.18	6,231	2.01
Other	304	4.11	33,878.41	2.71	20,194	0.63
Southern region	11,274	1.82	129,203.11	4.01	205,097	2.67
Whole Region	135,004	1.55	2,962,031.25	3.25	3,339,072	1.95
Proportion southern/ Whole Region	8.35		4.36		6.14	

Source: Industry Data Centre, Industrial Economics Offices, Ministry of Industry
Compiled by: Southern Development (as of July 2002)

Table 2.3: Gross Regional Product at Current Market Prices in Southern Thailand

unit: million baht

Sector	1993	1994	1995	1996	1997	1998	1999	2000p
Agriculture	96,207	120,816	152,735	156,994	156,044	172,332	144,589	155,709
Crops	37,377	52,925	73,636	73,945	69,617	78,088	57,995	62,861
Livestock	3,454	4,263	5,192	5,080	5,847	5,404	5,703	4,456
Fisheries	38,418	44,417	51,860	55,032	58,244	67,752	60,490	66,274
Forestry	5,396	4,533	4,954	4,830	5,073	3,613	4,038	3,068
Agricultural services	418	442	436	452	433	445	478	366
Simple agro-processing products	11,144	14,236	16,657	17,655	16,830	17,030	15,885	18,684
Mining and quarrying	3,661	4,573	5,092	6,237	7,960	8,468	8,719	10,597
Manufacturing	17,560	20,509	23,742	26,273	27,112	28,421	29,964	33,096
Construction	15,534	21,104	25,761	32,193	20,279	13,642	16,736	16,453
Electricity and water supply	5,498	6,068	7,179	8,498	10,455	13,586	12,123	14,121
Transportation and communication	16,403	17,915	20,838	23,237	25,559	23,211	22,672	22,827
Wholesale and retail trade	41,437	47,139	52,491	56,228	59,297	57,231	57,941	61,094
Banking, insurance and real estate	12,219	14,823	17,226	19,927	19,828	22,591	11,139	9,740
Ownership of dwellings	9,289	10,251	11,593	12,907	13,665	14,589	15,084	15,677
Public administration and defence	14,612	15,802	19,571	21,327	22,729	24,448	25,232	26,900
Services	37,262	40,767	49,887	55,079	61,179	67,649	74,461	82,539
GRP	269,680	319,767	386,115	418,901	424,106	446,168	418,661	448,754
Per capita GRP (baht)	35,345	41,298	49,162	52,619	52,625	54,698	50,728	53,794
Population (1,000 persons)	7,630	7,743	7,854	7,961	8,059	8,157	8,253	8,342

Source: NESDB Southern Development Centre

Table 2.4: Percentage Share of Gross Provincial Product for the Southern Region at Market Prices, 1993-2000p

unit: million baht

Province	1993	1994	1995	1996	1997	1998	1999	2000p
Phuket	7.9	7.49	7.21	7.50	7.83	8.49	9.44	10.20
Surat Thani	11.1	11.88	12.21	12.48	12.06	11.79	11.71	11.61
Ranong	4.5	3.49	3.73	3.45	3.24	3.15	3.02	2.89
Phangnga	3.8	3.94	4.06	3.83	4.15	3.51	3.35	3.55
Krabi	3.9	4.12	4.30	4.20	4.08	4.50	4.42	3.75
Chumphorn	5.3	5.40	5.04	5.25	5.06	5.42	5.47	5.06
Nakhorn si Thammarat	14.5	14.80	14.82	15.30	15.78	15.91	16.38	16.38
Songhla	19.5	19.21	18.79	18.37	18.50	18.67	18.31	18.25
Satun	3.2	3.08	3.08	3.07	3.15	3.36	3.51	3.73
Yala	4.0	4.08	4.25	4.13	4.12	3.99	3.84	4.11
Trang	6.2	6.50	6.76	6.82	6.55	6.29	5.86	5.88
Narathiwat	5.0	5.05	5.11	5.02	4.82	4.52	4.51	4.65
Phattalung	3.6	3.52	3.55	3.69	3.50	3.40	3.40	3.34
Pattani	7.4	7.45	7.09	6.89	7.14	6.99	6.76	6.61
South Total*	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
South Total**	8.5	8.8	9.2	9.1	9.1	10.4	9.0	9.1
Thailand Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: * As percent share of the South

Source: NESDB Southern Development Centre

** As percent share for Thailand

Table 2.5: Per Capita Income at Current Market Prices in Thailand

unit: baht

Region	1992	1993	1994	1995	1996	1997	1998	1999	2000
Northeastern	17,019	17,800	20,683	24,088	26,522	26,566	26,275	25,711	20,305
Northern	25,857	27,015	30,607	34,331	36,314	38,537	39,243	38,304	39,159
Southern	32,589	35,311	41,421	49,182	52,619	52,625	54,898	50,625	53,762
Eastern	68,310	78,828	91,986	111,344	129,762	143,709	151,393	148,997	166,789
Western	36,215	40,864	45,786	52,876	57,108	57,806	57,772	56,953	59,379
Central	43,080	46,698	55,900	63,662	73,013	74,394	72,462	71,908	75,748
Metropolitan Bangkok	156,214	173,991	191,301	210,989	223,104	222,007	201,842	202,506	208,540
Kingdom	49,410	54,650	61,903	70,474	76,847	78,093	75,594	74,946	76,591

Source: NESDB Southern Development Centre

Table 2.6: Per Capita Income at Current Market Prices in the Southern Region

unit: baht

Province	1992	1993	1994	1995	1996	1997	1998	1999	2000
Phuket	104,694	116,645	129,359	148,057	164,477	173,271	193,261	197,970	227,505
Surat Thani	34,623	36,602	45,947	56,052	61,355	59,340	60,324	65,475	58,451
Ranong	87,305	95,338	86,318	109,201	107,803	101,669	102,451	91,399	92,486
Phangnga	46,071	43,896	55,296	66,367	67,141	72,784	63,977	56,761	63,714
Krabi	32,741	34,731	43,570	53,169	55,512	53,939	61,641	56,237	50,732
Chumphon	31,830	34,389	41,188	46,244	51,494	49,707	55,173	51,543	50,746
Nakhorn si Thammarat	23,182	25,925	30,824	36,469	40,372	41,672	43,730	41,769	44,374
Songkhla	39,183	43,743	60,299	58,656	61,360	61,782	64,790	58,696	62,090
Satun	34,337	36,667	41,940	49,595	52,726	53,886	69,460	57,420	64,301
Yala	28,489	28,930	34,339	42,303	43,916	43,820	43,987	39,158	44,464
Trang	27,155	29,011	35,615	44,074	47,665	45,840	45,877	39,536	42,208
Narathiwat	22,096	22,584	26,420	31,751	33,340	32,015	31,107	28,685	31,357
Phatthalung	19,153	20,190	23,138	27,772	20,913	29,362	29,666	27,609	28,687
Pattani	30,590	35,001	41,231	46,972	48,839	50,536	51,481	46,088	47,730

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Source: NESDB Southern Development Centre

3. HUMAN RESOURCE DEVELOPMENT IN SOUTHERN THAILAND

3.1 Background

According to a 1997 UNDP report, Thailand ranks 67 among the 174 countries in human resource development, behind Singapore and Malaysia. In international studies of the teaching and learning of mathematics and science, Thailand has consistently ranked in the middle level for the past several years. As for English-language proficiency, Thailand holds a lower position among ASEAN countries.

Since the latter half of the 1990s, the Thai Government has expended 200 trillion baht, corresponding to about 20 percent of the government budget, for education. This expenditure is comparable to about 4 percent of GDP for the same period, but no recognizable improvements have been achieved because of inefficient educational methods. Only 10,000 students graduate from engineering faculties each year, and there is a serious shortage of engineers, particularly at the regional level.

In southern Thailand, engineering applicants are likely to look for jobs in companies that provide them with the most favourable terms, typically companies in Bangkok or along Thailand's eastern seaboard. Consequently, the shortage of engineers in the South has become a disincentive for the growth of local business.

Higher education in Thailand is concentrated in Bangkok. At present, 12 public universities, fully half of the 24 public universities in the country, are based in Bangkok; and 24 private universities, about 43 percent of the 53 private institutions in Thailand, are also based in Bangkok (See Tables 3.1 and 3.2). In the South there are only three universities and four colleges: Prince of Songkhla University, Taksin University, Walailak University, Hat Yai City College, Southern College of Technology, Tapee College, and Yala Islamic College. Among these, only Prince of Songkhla University offers Doctoral programmes and a wide range of science and engineering faculties. The small number of higher education institutions in the local area may hinder the development of the human resources required in the knowledge-based economy.

3.2 The Role of Universities in the Region

In local areas, universities have a very important role for human resource development. As a case study, the role of Prince of Songkhla University, the representative university in the South, has been examined.

Prince of Songkhla University was the first national university in Thailand's South. Since its establishment in 1967, it has grown rapidly and attained a position as the premier university in the region. Currently, satellite campuses are located in Hat Yai, Pattani, Phuket, Surat Thani and Trang.

At the end of 2001, enrolment totalled about 16,000 students. Among these, there were about 13,000 faculty students (84 percent), 8 graduate diploma students (0.1 percent), about 2,400 Master's-degree programme students (15 percent) and 91 Doctoral-degree programme students (0.6 percent). These figures reflect that the promotion of students to Masters and Ph.D. programmes is very limited.

There are 14 faculties at Prince of Sonkhla: Agro-industry, Dentistry, Education, Engineering, Environmental Management, Service Industries, Humanities and Social Science, Management Science, Medicine, Natural Resources, Pharmaceutical Science, Nursing, Science, and Science and Technology. In addition, several research institutes are attached and contribute to the extension of higher education throughout the region.

The central library currently has 30 personal computers, which all operate with Windows 98, with an additional 20 computers scheduled to arrive in 2004; about 200,000 books; some 1,100 periodicals; and audio-visual materials. Library personnel were scanning materials to create a database but that scanning has stopped for the time being, due to copyright issues. Only the journals published by the university are in electronic format. About 500,000 titles of books, journals and other materials are catalogued in the database, which is connected to 51 libraries, including the principle public and private university libraries, Library of Parliament, Thai National Assembly Library and the library at the National Science and Technology Development Agency. Inter-library loans are available through a network (see Table 3.3). Such a library network is instructive to local students and other users.

In addition, the database, which includes about 1,700 titles of dissertations in both Thai and English, is available for the retrieval of titles and abstracts for a fee. Reports indicate that about 3,000 people use the dissertation database each year. Public universities in Thailand will soon be turned into independent administrative institutions, after which the universities themselves will manage this database service for external users. The database shall be further made available to businesses seeking fundamental or more advanced studies related to a KBE.

The Computer Centre has 200 personal computers, all using Windows 98. All faculties also have computer access: one for every five students on the Hat Yai campus and one for every ten students at all other campuses. Most students do not own a notebook computer, as these are still expensive in Thailand, so they often use the university computers on campus. The Computer Centre has two instructors to provide not only assistance to students but also training for students and the public for a nominal fee. There are now 17 training courses on offer. As for basic courses, these include a 13-hour course for Word and a

9-hour course for e-mail operation. In addition, there is a course in e-commerce for MBA students. The university is open to the local community, and outside users are increasing, even for ICT. The need for more instructors and better equipment are issues to be resolved.

Meanwhile, after graduation from Prince of Songkhla University, approximately 80 percent of graduates reportedly leave the region to find work at industrial estates in Bangkok or along the eastern seaboard. Part of the reason for this is that the South mostly produces primary commodities like rubber, farm products and minerals, having only one industrial estate in Chalung. The university should play a leading role in creating employment in the region by fostering local and venture companies through cooperation between businesses and universities.

3.3 Japanese Cooperation in Upgrading IT Literacy

Thailand's Ministry of Education has set a target for approximately 70 percent of primary and secondary students to acquire personal computer (PC) skills by 2004, competing with those educated in Singapore and Malaysia in the field of IT. Their plan involves asking 15-20 million students in Thailand to prepare their school reports in all subjects using PCs. Above all, the Government is emphasizing the diffusion of SchoolNet to enhance ICT education in the whole country. As for the South, the number of schools registered to SchoolNet have been increasing (See Table 3.5). In this way, the Government hopes to foster an environment conducive to connecting to the Internet in primary, middle and professional schools and to train 500,000 teachers throughout the country to be PC literate. However, graduates from science and mathematics faculties are likely to move to major cities where they can find better employment opportunities. Consequently, the re-education of teachers in all regions is urgently required. It is not an easy task to improve IT literacy.

Since 2002, Japan has provided technical cooperation on a three-year project for Information Technology Development and Upgrades in Education. The activities involved include: 1) training instructors in ICT; 2) preparing an applied curriculum for ICT; and 3) diffusing ICT in all regions. For this, Chiang Mai, Nakhorn Ratchasima and Songkhla are designated as model cities

for the project. Ratchaburi and Chonburi, provinces in central Thailand where the Thai Government plans to donate PCs, are also covered by the project.

At the Provincial Non-Formal Education Centre in Songkhla, which is equipped with the latest PCs and peripherals, experts are teaching ICT. They teach PC use at public facilities in local villages, conveying computers by car to the villages. The focus is on training teachers in the primary and middle schools; ICT experts plan to instruct about 600 teachers who live in the Songkhla area.

There is also a programme to dispatch selected teachers to universities in Japan for a brief period of leadership training.

The improvement of teachers' ICT literacy is considered crucial for dissolving the digital divide in the region. We hope that this cooperation with Japan can help improve the situation.

The Tokyo Institute of Technology has enjoyed close ties with King Mongkut's Institute of Technology since 2002, and a liaison office was opened in Bangkok. Using a satellite connection, they started the Graduate School Distance Learning Programme (English) in real time.

It is expected that the southern universities, like Prince of Songkhla, could strengthen relationships with universities in Japan and other countries, as well as improve educational standards through distance learning.

Table 3.1: National Universities in Thailand

Universities	Headquarters	Number			
		Foundation	Students[*1]	Teachers[*1]	Degree[*2]
Burapha University (BUU)	Chonburi	1990	6,613	527	BMD
Chiang Mai University (CMU)	Chiang Mai	1964	21,550	1,977	BMD
Chulalongkorn University (CU)	Bangkok	1917	26,381	2,895	BMD
Kasetsart University (KU)	Bangkok	1943	27,366	1,894	BMD
Khon Kaen University (KKU)	Khon Kaen	1964	17,938	1,869	BMD
KMIT Ladkrabang (KMITL)	Bangkok	1960	14,313	750	BMD
KMIT North Bangkok (KMITNB)	Bangkok	1959	12,000	564	BMD
KMUT Thonburi (KMUTT)	Bangkok	1960	8,599	406	BMD
Maejo University (MJU)	Chiang Mai	1934	5,845	272	BMD
Mae Fah Luang University (MFU)	Chiang Rai	1997	300	N/A	B
Mahasarakham University (MSU)	Mahasarakham	1994	12,400	292	BMD
Mahidol University (MU)	Bangkok	1943	26,859	2,711	BMD
Naresuan University (NU)	Phitsanulok	1990	14,104	557	BMD
National Institute of Development Administration (NIDA)	Bangkok	1966	6,225	176	MD
Prince of Songkhla University (PSU)	**Songkhla**	**1967**	**15,033**	**1,563**	**BMD**
Ramkhamhaeng University (RU)	Bangkok	1971	355,352	834	BM
Silpakorn University (SU)	Bangkok	1943	7,399	664	BMD
Srinakharinwirot University (SWU)	Bangkok	1949	13,452	1,217	BMD
Sukhothai Thammathirat Open University (STOU)	Bangkok	1978	209,680	388	BM
Suranaree University of Technology (SUT)	Nakhon Ratchasima	1990	5,473	N/A	BMD
Thaksin University (TSU)	**Songkhla**	**1996**	**3,609**	**165**	**BM**
Thammasat University (TU)	Bangkok	1934	20,667	1,103	BMD
Ubon Ratchathani University (UBU)	Ubon Ratchathani	1996	3,609	286	BM
Walailak University (WU)	**Nakhorn si Thammarat**	**1992**	**2,153**	**N/A**	**B**

Note: [*1] statistics in 1999

[*2] B = Bachelor, M = Masters, D = Doctorate

KMIT – King Mongkut's Institute of Technology, Kmut = King Mongkut's University of Technology

Bold letters mean universities in southern Thailand

Source: Ministry of University Affairs

Table 3.2: Private Universities in Thailand

Universities	Headquarters	Number			
		Foundation	Students[*1]	Teachers[*1]	Degree[*2]
Asian University of Science and Technology (Asian UST)	Chonburi	1997	155	26	BM
Assumption University (AU)	Bangkok	1969	18,197	1,119	BMD
Bangkok University (BU)	Bangkok	1962	24,074	1,013	BMD
Bangkok Thonburi College (BTC) [*3]	Bangkok	2002	N/A	N/A	N/A
Bundit Boriharnthurakit College (BBC) [*3]	Khon Kaen	2002	N/A	N/A	N/A
Chaopraya University (CPU)	Nakhorn Sawan	1998	1,268	87	BM
Christian University (CTU)	Bangkok	1983	1,206	88	BM
College of Asian Scholars (CAS) [*3]	Khon Kaen	1999	N/A	N/A	B
Dhurakijpundit University (DPU)	Bangkok	1968	21,463	370	BM
Dusit Thani College (DTC)	Bangkok	1993	632	38	B
Eastern Asia University (EAU)	Bangkok	1996	2,418	99	BM
Far Eastern College (FEC)	Chiang Mai	1999	996	35	B
Hat Yai City college (HCC)	Songkhla	1997	3,166	88	BM
Huachiew Chalermprakiet University (HCC)	Bangkok	1981	7,137	302	BM
Kasem Bundit University (KBU)	Bangkok	1987	11,359	403	BM
Krirk University (KRU)	Bangkok	1970	4,131	526	BM
Lumnamping College (LPC)	Tak	1997	330	35	B
Mahanakorn University of Technology (MUT)	Bangkok	1990	7,679	102	BM
Mission College (MC)	Bangkok	1986	578	62	B
Nivadhana University (NU)	Suphan Buri	1997	1,309	139	BM
North Bangkok College (NBC)	Bangkok	2000	562	34	B
North-Chiang Mai College (NCC)	Chiang Mai	1999	383	48	B
North Eastern Polytechnic College (NPC)	Ubon Ratchatani	1999	751	13	B
North Eastern University (NEU)	Khon Kaen	1988	7,179	247	BM
Pathumthani College (PTC)	Pathum Thani	1999	716	41	B
Payap University (PYU)	Chiang Mai	1974	8,782	403	BM
Phakklang College (PKC)	Nakhon Sawan	1986	1144	70	BM
Rajapark College (RPC)	Bangkok	1993	333	50	B
Rangsit University (RSU)	Pathum Thani	1986	11,690	626	BM
Ratchatani College of Technology (TRC)	Ubon Ratchatani	1993	2,393	108	BM
Ratchathani Udon College of Technology (RCT)	Ubon Thani	1998	684	42	B
Rattana Bundit College (RBAC)	Bangkok	1997	8,830	137	BM
Saengtham College (STC)	Nakhorn Pathom	1975	226	26	B
St. John's University (SJU)	Bangkok	1989	3,081	183	BM
St. Louis College (SLC)	Bangkok	1986	438	168	B
St. Theresa College (STIC)* [3]	Nakhorn Nayok	2001	N/A	N/A	N/A
Santapol College (SP)	Udon Thani	1978	795	26	B

Table 3.2: Private Universities in Thailand (continued)

Universities	Headquarters	Number			
		Foundation	Students[*1]	Teachers[*1]	Degree[*2]
Shinawatra University (SIU)*[3]	Pathum Thani	1999	N/A	N/A	B
Siam University (SU)	Bangkok	1973	12,378	457	BM
South-East Asia University (SAU)	Bangkok	1973	5,997	247	BM
Southeast Bangkok College (SBC)	Bangkok	1999	650	40	B
Southern College of Technology (SCT)	Nakhorn si Thammarat	1999	497	78	B
Sripatum University (SPU)	Bangkok	1970	15,833	540	BM
Srisophon College (SSC)	Nakhorn si Thammarat	1984	1,510	60	B
Schiller Stamford International College (SSIC)	Phetchaburi	1995	317	25	BM
Tapee College (TPC)	Surat Thani	1999	533	30	B
Thonburi College of Technology (TCT)	Bangkok	1998	1,617	147	B
Thongsook College (TSC)	Bangkok	1993	849	35	B
University of the Thai Chamber of Commerce (UTCC)	Bangkok	1940	23,395	755	BM
Vongchavalitkul University (VU)	Nakhorn Ratchasima	1984	4,011	168	BM
Webster University (Thailand) (WUT)	Phetchaburi	1997	216	21	BM
Yala Islamic College (YIC)	Yala	1998	506	31	B
Yonok college (NYC)	Lampang	1988	1,648	113	BM

Notes: [*1] statistics in 1999
[*2] B = Bachelor, M = Masters, D = Doctorate N/A = No data
[*3] Preparing or right after sharing
[*4] Bold letters mean universities in southern Thailand

Source: Ministry of University Affairs

Table 3.3: Library Web Sites in Thailand

National University Libraries	ULR
Kasetsart University Library	http://www.lib.ku.ac.th
Instructional Resource Center Khon Kaen University	http://library.kku.ac.th
Center of Academic Resources of The Chulalongkorn University	http://www.car.chula.ac.th
Chiang Mai University Library	http://www.lib.cmu.ac.th
Taksin University Library	http://www.tsu.ac.th/Faculty/lib001th.asp
Thammasat University Library	http://library.tu.ac.th
Naresuawn University Library	http://www.lib.nu.ac.th
Burapa University Library	http://www.lib.buu.ac.th
The Mahasarakarm University Center of Academic Resources	http://www.library.msu.ac.th
Mahidol University Library	http://www.li.mahidol.ac.th
Ramkhamhaeng University Central Library	http://www.lib.ru.ac.th
Srinakarintaraviroj Prasarnmitr University Library	http://www.swu.ac.th/lib
Silapakorn University Library at Thapra Palace Campus	http:///www.thapra.lib.su.ac.th
Silapakorn University Library at Sanarm Chan Palace Campus	http://www.snamcn.lib.su.ac.th
Prince of Songkhla University Central Library at Pattanee	http://tanee.psu.ac.th
Prince of Songkhla University Central Library at Had-Yai	http://www.clib.psu.ac.th
Prince of Songkhla University Health Science Library at Hat Yai	http://medinfo.psu.ac.th
The Office of Documentation and Information, Sukhothai Thammathirat University	http://www.odi.stou.ac.th
Center of Academic Resources of the Ubonrajthani University	www.lib.ubu.ac.th
Central Library, King Mongkut's Institute of Technology North Bangkok	http://library.kmitnb.ac.th
Central Library, King Mongkut's Institute of Technology Ladkrabang	http://www.lib.kmitl.ac.th
King Mongkut's University of Technology Thonburi Library	http://www.lib.kmutt.ac.th
Library and Information Center National Institute of Development Administration	http://library2.nida.ac.th
The Center for library resources and educational media, Walailuk University	http://clm.wu.ac.th
The Center for library resources and educational media, Technology Suranaree University	http://sutlib1.sut.ac.th/index.html
Maejo University Library	www.mju.ac.th/president/library/mainlib.htm

Table 3.3: Library Web Sites in Thailand (continued)

Private University Libraries	
Central Library, Bangkok University	http://cenlibk.bu.ac.th
ABAC University Library	http://library.au.ac.th
St. John's University Library	http://www.stjohn.ac.th/lib
Sri Pathum University Library	http://library.spu.ac.th
Technical Information Access Center	http://www.tiac.or.th
Payap University Library	http://lib.payap.ac.th
School Library	
Digital Library for SchoolNet	http://www.school.net.th/library/
Electronic Library, Non-Formal Education	http://dnfe5.nfe.go.th/index.htm
Suan Kularb Library	http://library.sk.ac.th
St. Gabriel's college Library	http://sglib.cjb.net
Other Library	
National Library	http://www.span.com.au/nlt
Thai National Assembly Library	http://www.parliament.go.th/library
The Council of State of Thailand Library	http://www.krisdika.go.th/html/fslaw.htm
Department of Intellectual Property Library	http://www.ipic.moc.go.th
National Research Council of Thailand Library	http://www.riclib.nrct.go.th
Kanchanapisek Library	http://kanchanapisek.or.th/kp1/lib
Department of Agricultural Extension Library	http://www.doae.go.th/library/
Child Institute, Foundation for Children Library	http://www.childthai.org/cic/c001.htm
Dhamma Library	http://members.tripod.com/~budish/
The Thai Astronomical Society Library	http://thaiastro.nectec.or.th/library/library.html
Library & Information Centre, Bank of Thailand	http://www.bot.or.th/libr/public/center/bot11.html
Siam Commercial Bank Library	http://telecom.scb.co.th/LIB
Electronic Library	http://www.geocities.com/Tokyo/Harbor/2093/index.html
Withayapat Library	http://wphat.simplenet.com
Department of science service library	http://www.dss.go.th
Other Resources	
The Council of State of Thailand Library	203.152.23.33/html/fslaw.htm
Uncover article	www.carl.org
Thailand resource	www.journallink.or.th
Science direct article	www.sciencedirect.com (choose group-wide login)
ACS on Web edition at K. Long library	http://pubs.acs.org
Springer link database	http://link.springer.de/ol/index.htm
University library database project (ThaiLIS)	www.uni.net.th/html_file/ThaiLIS/database1.htm

Source: Central Library at Prince of Songkhla University

Table 3.4: Number of Schools Registered to SchoolNet in the Southern Provinces of Thailand

Southern Thailand provinces	Number of schools registered to SchoolNet
Chumphorn	32
Krabi	29
Nakhorn sri Thammarat	75
Narathivat	31
Phangnga	32
Phattalung	79
Pattani	34
Phuket	33
Ranong	10
Satun	17
Songkhla	104
Surat Thani	52
Trang	63
Yala	31

Source: http://user.school.net.th/school-zone

4. THE PROSPECT OF AN INDUSTRIAL CLUSTER AND THE DEVELOPMENT OF THE SOUTHERN BORDER

4.1 Investment

The main industrial sector in the South is resource-based or agricultural industry, including rubber, rubber wood process, oil palm and fishery. As seen in Table 4.1, investment is also concentrated in the agricultural sector. ICT-related industries, such as the electronics and electrical appliances, account for many of the applications to the Board of Investment. Approved applications in 2002 indicate most of the investments are rubber-related and food products, while the applications for the manufacturing industry are quite minor (see Figure 4.1). The main foreign investment comes from Malaysia, Singapore and Taiwan. In the case of Japan, there were ten applications to investment that consisted of rubber-related products and food products, such

as frozen-prepared food, for the period of 1997-2002. Now, more than half of those applications are operating in the South.

By areas within the South, the Upper South has attracted 47 percent of all investments, while the other 53 percent has been invested farther south, particularly in Songkhla. In the past five years, there was an average of 40-50 projects per year and average investment of approximately 5,000 million baht along the route between Hat Yai and Sadao. However, there was not so much investment distribution to the other four southern border provinces of Pattani, Yala, Narathiwat and Satun. Most of the investments in this region are in resource-based industry, such as fishery, food and rubber products.

4.2 Southern Industrial Estate

The Southern Industrial Estate (Chalung Industrial Estate) is located in Hat Yai, Songkhla province, 900 km south of Bangkok and is operated directly by the Industrial Estate Association of Thailand (IEAT). It is 16 km from Hat Yai airport, 47 km from the port of Songkhla and 47 km from the border with Malaysia. First developed in 1994, it covers approximately 3.8 million sq m, consisting of a general industrial zone (GIZ) and an export and production zone (EPZ). Only seven (of domestic and foreign origin) companies have moved to the site. These include one Japanese, one American, one local and four joint companies with Malaysia. The businesses involved are five automobile/two-wheeled-vehicles-parts companies, one electronic/electric machinery company and one other manufacturer.

The Southern Industrial Estate is near the border with Malaysia with a well-structured network of roads that offers the advantage of traffic access from airports in Surat Thani, Hat Yai, Phuket and elsewhere, as well as from the port of Songkhla. The promotion of both environmental sensitivity and company activities are mandatory.

One reason why few companies have moved here is that it has been difficult to attract both foreign and domestic companies because of delays in infrastructure improvements since the economic crisis began in 1997. The demand for industrial estates has been steadily, but slowly, increasing since 2000, and the recovery is still limited to specific regions.

In July 2002, Thailand launched the "Rubber City" project to integrate rubber-related industries, the leading industry in the South, into the Southern Industrial Estate. Thailand is a major rubber-exporting country, but many of the exported articles are low-priced products, like rubber sheets. No value-added manufacturing products have been developed. The Rubber City project is expected to contribute to productivity and to improve the quality of the industry. In Malaysia, many farms are switching from rubber cultivation to oil palm cultivation because palm trees grow more swiftly after planting than rubber does and are more profitable. As a result, Malaysian rubber companies are moving to southern Thailand. The project's promotion is expected to attract more rubber-related companies.

The budget for the project, which amounts to 1 billion baht, is to be used for infrastructure, such as electricity, water, telecommunications, etc. and for the construction of a rubber research and development centre, institutes or laboratories and an engineer training centre, among other facilities.

The project will start in 2003 and participating companies will be allowed free rent for four years, among other benefits. It is expected that Rubber City could produce such value-added rubber products as medical instruments, automobile parts, sporting goods and home-decoration products and that rubber consumption could increase.

As for non-rubber industries, some factories, including those producing boards for furniture, ceramics, canned seafood and automobile parts made of rubber, are currently located in the Southern Industrial Estate, but there are no electronics companies.

The idea is to eventually perform assembly work at the Southern Industrial Estate, thereby attracting factories currently in Penang, Malaysia, where many electronics companies exist but find it difficult to compete internationally because of poor infrastructure and non-competitive costs. The integration of industries specializing in rubber, agro-industry, etc., to heighten added value through enhanced R&D and the promotion of marketing strategies using ICT should be mandatory.

4.3 Border Trade

In southern Thailand, border trade has a very important role for regional development. The South conducts border trade with Malaysia and Myanmar and can be classified into three types:

(1) Border trade by villagers, mainly consumer products.
(2) Retail border trade for small business.
(3) Wholesale border trade by firms with high import-export costs, such as lumber import, rubber export or high-price consumer products.

There are four provinces involved in the Thai-Malaysian border trade: Songkhla, Yala, Narathiwat and Satun. The overall border distance is 672 km. Trucks and trains are ordinarily used for the transportation of trade in both countries. However, the road network, especially minor roads, is still poor. Enhancement of the transportation network is required between markets and local provinces that produce agricultural raw materials.

As for the border trade between Thailand and Malaysia, Thailand has a considerable excess of imports. This is owing to the difference of commodity items. Thailand imports mainly machinery and construction equipment, while the country exports rubber and resource-based products (see Tables 4.2 and 4.3).

4.4 Trade Gateway

It is noted that in the South near the border with Malaysia, people's income is relatively small and Islamic culture predominates. Security problems have resulted in the suspension of development. However, the development process is coming under review, taking into consideration the geographic advantages and progress of the Association of Southeast Asian Nations Free Trade Area (AFTA).

One consideration is the South's exploitation potential as the gateway for surface transportation from Malaysia. In southern Thailand, the trade route at the border between the two countries is by road at Sadao, by rail at Padung Besar and by sea at Takbai. The road link at Sadao is relatively significant for trade. Sadao is a border city in Songkhla province, about 50 km from Hat Yai along National Route 4. In the border trade with Malaysia, industrial products

are imported and primary products, like rubber, are exported. Problems include inadequate facilities at the checkpoint for customs clearance, the chaotic environment of the border market and the need for financial infrastructure, including banks. The application of Electronic Data Interchange (EDI) could be considered for more efficient customs clearance.

EDI involves the exchange of data electronically, using the Data Format Standard. The EDI system works in the following way:

1) Information regarding entry and invoices are entered into a specified format at a company's office and then forwarded online to the customs office.
2) The customs' computer system receives the data, performs the required checks and sends the entry number and a message about the inspection of the cargo back to the company.
3) The importer or exporter pays the tax directly to customs or at a bank.
4) Entry and related documents are submitted at the time of cargo inspection.
5) A customs officer checks the documents, and the computer assigns an inspector automatically.
6) Inspection takes place using the sampling methodology.

EDI's merits compared with the manual method are as follows:

1) The process is faster;
2) Use of computers improves the quality of document checking;
3) Costs are reduced in document preparation and time is saved in communication with the customs office; and
4) A database is generated at customs.

Customs Bureau officials say that currently most of their clearance services (90 percent for exports, 81 percent for imports) in Thailand use the EDI system. Approximately 60 percent of data transmissions are through the Communication of Authority of Thailand (CAT) and approximately 70 percent through Trade Siam.[1]

Pertinent issues for EDI in Thailand are as follows:

[1] Trade Siam Co. Ltd is a semi-governmental EDI service provider that connects users with the Customs Department. The ratio of capital invested is 49 percent from the Government and 51 percent from the private sector.

1) The adoption rate of EDI, especially in small and medium enterprises, is low, because of the high cost of introducing the system.
2) Digital certificates are not widely recognized.
3) Even if data are processed by the EDI system, at some point printed copies of documents will be required. Even with these deficiencies, the Thai Government should learn from Singapore and make an effort to introduce the EDI system throughout the entire export process, establishing a paperless system in government organizations, educating people and passing legislation covering digital certificate organization.

The customs office in Sadao introduced EDI in 2001, quickly improving the speed of its operations. Customs clearance, including inspection, now takes about 30 minutes. Inspection is not carried out on all cargo; the inspection of some cargo from accredited companies can be skipped.

Thailand is bordered by four countries: Malaysia, Myanmar, Lao PDR and Cambodia. Of these, Thailand does its largest trade with Malaysia. In 2001, exports to Malaysia amounted to approximately 121 billion baht, ranking sixth among all countries; imports from Malaysia amounted to 136.7 billion baht, ranking fourth among all countries.

Surface transport down the Malay Peninsula from Bangkok to Kuala Lumpur can be performed within three days. As for cost, more expensive transportation cost by ocean shipping is 1.3 times more expensive than trucking costs, and aerial transport is seven times more than trucking costs.[2] Surface transport will be more significant in the future, owing to the utilization of EDI and the promotion of more efficient transportation systems in both countries.

In the route described above, north-bound (Malaysia to Thailand) transport primarily carries electric/electronic parts like IT-related products, while south-bound (Thailand to Malaysia) transport carries automobile parts. This route is expected to become a land gateway.

As for the sea transport currently, freight by sea via Singapore is the main channel of trade between Thailand and Malaysia. However, container shipping from Bangkok to Kuala Lumpur normally takes about two weeks, following

[2] Refer to Tusho Koho, published by Jetro in 21 August 2002, p22.

the route from Laem Chabang port in Thailand to the Port of Klang (Kuala Lumpur) in Malaysia via Singapore. The Port of Songkhla in southern Thailand is used more as a domestic port than as a port of international trade. It is mainly used for transporting rubber and other products to Laem Chabang port. The Songkhla Port Authority has not yet introduced EDI for customs clearance, and it needs to improve the infrastructure so that the port can serve as a hub in the South.

4.5 The Indonesia-Malaysia-Thailand Growth Triangle

The concept of Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) was advocated by Malaysia's Prime Minister Mahathir in 1993. IMT-GT consists of the two Indonesian provinces of North Sumatra and Daerah Istimewa (DI) Aceh; the four northern Malaysian states of Kedah, Penang, Perak and Perlis; and five provinces of southern Thailand, Narathiwat, Pattani, Satun, Songkhla and Yala. IMT-GT aims at private sector-led economic growth and regional development in corporation with each government.

The development of IMT-GT depends on the exploitation of each region's own resources, industries and labour power and the ability to supply them to other regions. North Sumatra is producing petroleum and natural gas and has the potential to involve the Thai market deeply. In this region, as well as in southern Thailand, the economy depends principally on resources. In northern Malaysia, manufacturing industries such as the electronic industry have been developed and have an advantage in technology over Thailand. On the other hand, they suffer from a chronic labour shortage. In southern Thailand, there is plenty of cheap labour but the technical capabilities still lag behind the skills needed in northern Malaysia. For this reason, they cannot yet service northern Malaysia's industries that require skilled labourers. There is a pressing need to develop the capabilities of human resources. The same holds true even for North Sumatra.

For further development of IMT-GT, it is critical to develop human resources, together with increased promotion of border trades and tourism, to simplify customs clearing for labour immigration, eliminate tariff and non-tariff barriers among the three countries and expand infrastructure

building of telecommunications and transportation. It is proposed to proceed with regional cooperation, such as training programmes for foreign workers before and after hiring, establishment of a technical training centre in southern Thailand and technical training programmes in northern Malaysia. Malaysia has been proceeding with a plan to install more industrial estates along the border with Thailand. The plan encourages the upgrading of industries in southern Thailand to promote international specialization between Malaysia and Thailand and the building of ICT-related parts factories. For this goal, it is imperative to develop engineers and skilled workers. With the development of IMT-GT, people expect that the trade with the markets in China and in other neighbouring countries will be promoted through the gateway in southern Thailand.

Meanwhile, Prince of Songkhla University in Thailand took a leading role in 1996 in establishing the University Network (UNINET) among eight universities in the three countries. The UNINET aims at research and investigation of IMT-GT-related regional issues and other global issues and examines the contribution to the development of IMT-GT. In addition to research and investigation, UNINET officials promote database building, organize seminars and dispatch students for intensive training at universities in the project. Adoption of the credit transfer system among the universities for students is in progress and distance learning through the Internet is also being considered. With the coming of a KBE, the network with the universities in neighbouring countries could play a more important role in the region. Further development of UNINET is to be expected. The following are the participants in UNINET:

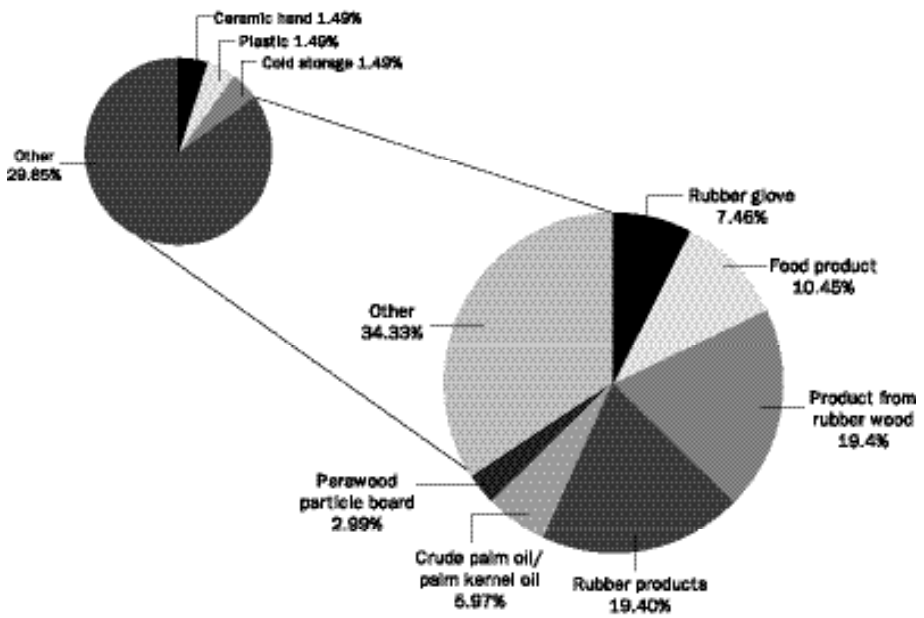
- University of Andalas, Indonesia
- Universitas Sumatra Utara, Indonesia
- University Teknologi MARA, Malaysia
- University Sains Malaysia, Malaysia
- University Utara Malaysia, Malaysia
- Prince of Songkhla University, Thailand
- Thaksin University, Thailand

Table 4.1: Approved Application of Investment in Southern Thailand in 2002

Activities	2001			2002		
	No. of projects	Investment (million baht)	Thai employees	No. of projects	Investment (million baht)	Thai employee
Section 1: Agriculture and agricultural products	35	3,617.95	11,301	51	8,310.03	9,429
Section 2: Mining, ceramics and basic metals	4	189.20	316	1	6.00	30
Section 3: Light industry	4	159.74	1,191	0	0	0
Section 4: Metal products, machinery and transport equipment	2	17.99	238	5	429.50	216
Section 5: Electronic industry and electrical appliances	2	43.80	249	1	12.20	44
Section 6: Chemicals, paper and plastic	0	0.00	0	3	158.80	62
Section 7: Services and public utilities	5	2,820.00	1,333	6	763.61	305
Total	52	6,848.68	14,628	67	9,680.14	10,086

Source: BOI Southern Region Investment Centre

Figure 4.1: Approved Investment by Sector in 2002



Source: BOI Southern Investment Centre

Table 4.2: Value of Goods Exported Through Customs Offices in Five Southern Border Provinces, by Products 1996 - 2000

unit: million baht

Goods	1996		1997		1998		1999		2000		2001	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Rubber	(1)36,479.72	49.09	(1)33,364.93	36.84	(1) 33,505.57	32.78	(1)27,927.64	28.84	(1)37,232.12	28.85(1)	36,843.62	28.96
Natural gas	3,737.67	5.03	2,686.11	2.97	3,858.84	3.78	2,843.60	2.94	3,230.03	2.50	293.12	0.23
Fuel oil	255.89	0.34	2,319.45	2.56	1,552.19	1.52	11.13	0.01	14.72	0.01	24.63	0.02
Tin	-	-	3.81	0.00	1.82	0.00	-	-	-	-	-	-
Other mineral	139.43	0.19	153.62	0.17	169.29	0.17	105.36	0.11	114.92	0.09	98.68	0.08
Fish	350.77	0.47	541.37	0.60	607.17	0.59	856.58	0.88	175.29	0.14	0.60	0.00
Corn, millet, bean, flour	470.09	0.63	542.48	0.60	566.06	0.55	702.72	0.73	701.64	0.54	744.37	0.59
Vegetable, fruit	535.85	0.72	739.29	0.82	584.01	0.57	739.31	0.76	860.31	0.67	662.99	0.52
Aquatic animal	(2)11,891.79	16.00	(2) 15,765.89	17.41	(2) 16,149.83	15.80	(2)15,913.38	16.44	(2)16,146.59	12.51	(2)18.693.95	14.70
Canned food	(3) 4,832.61	6.50	(3) 7,888.65	8.71	(3) 12,710.58	12.43	(3)10,080.80	10.41	9,167.66	7.10	11,094.70	8.72
Charcoal	2.15	0.00	0.61	0.00	0.61	0.00	0.06	0.00	5.97	0.00	1.32	0.00
Rubber convert	1,068.87	1.44	2,050.05	2.26	1,130.32	1.11	2,302.88	2.38	3,144.59	2.44	2,763.97	2.17
Plastic seed	12.01	0.02	16.65	0.02	148.14	0.14	147.42	0.15	102.59	0.08	-	-
Livestock, poultry	149.88	0.20	157.81	0.17	213.97	0.21	32.96	0.03	18.58	0.01	18.83	0.01
Cement, lime	67.11	0.09	83.34	0.09	43.63	0.04	47.17	0.05	48.81	0.04	46.17	0.04
Rubber glove	3,192.57	4.30	4,208.71	4.65	6,475.31	6.33	4,375.47	4.52	4,626.52	3.58	7,012.45	5.51
Other	11,121.17	14.97	20,049.44	22.14	24,501.39	23.97	29,198.64	30.16	40,668.89	31.51	35,089.05	27.58
Crude oil	-	-	-	-	-	-	1,539.18	1.59	(3)12,802.66	9.92	(3) 13,816.83	10.86
Total	74,307.58	100.00	90,572.21	100.00	102,218.73	100.00	96,824.30	100.00	129,061.78	100.00	127,205.28	100.00

Note: Includes customs office Songkhla, Had Yai airport, Padangbesar, Sadao, Pattani, Narathiwat, Takbai, Sungaiko-lok, Betong, Satun and Pakbara.

Compiled by: Southern Development Centre

(1) = Goods exported through customs office no. 1

(2) = Goods exported through customs office no. 2

(3) = Goods exported through customs office no. 3

Source: Bank of Thailand, southern branch

Table 4.3: Value of Goods Imported Through Customs Offices in Five Southern Border Provinces, by Products 1996 - 2000

unit: baht

	1996		1997		1998		1999		2000		2001	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Food	761,584,244.0	2.65	618,174,627.5	2.14	465,810,956.2	1.17	654,660,341.0	1.22	1,053,210,107.0	2.25	1,233,133,910.0	2.33
Mine equipment	263,446.0	0.00	1,002,479,211.2	3.48	371,519,681.0	0.93	3,223,348.0	0.01	-	-	-	-
Machinery and equipment	(1)12,420,551,365.7	43.19	(1)6,846,277,182.6	23.75	(1)10,694,645,429.9	26.75	(1)25,093,738,027.0	46.70	(1)8,663,100,870.0	18.51	(1)20,202,269,213.0	38.24
Car and equipment	212,125,323.6	0.74	323,772,852.2	1.12	104,930,264.9	0.26	552,967,366.0	1.03	717,670,503.0	1.53	931,960,016.0	1.76
Construction equipment	(3)2,822,506,494.6	9.81	(3)1,770,661,419.2	6.14	(3)930,190,758.5	2.33	1,113,793,318.0	2.07	1,259,140,675.0	2.69	1,080,396,002.0	2.04
Fuel oil	400,986,082.1	1.39	535,935,550.8	1.86	246,809,733.2	0.62	267,266,430.0	0.50	17,079,911.0	0.04	-	-
Coal	-	-	-	-	-	-	-	-	-	-	-	-
Chemical and manure	815,483,458.1	2.84	641,648,352.8	2.23	932,119,505.5	2.33	(3)1,416,457,349.0	2.64	(3)1,842,123,349.0	3.94	(3)1,503,564,596.0	2.85
Aquatic animal (2)	3,585,048,990.7	12.47	(2)5,010,475,318.7	17.38	(2)6,618,448,651.6	16.56	(2)5,865,440,188.0	10.91	(2)4,963,695,780.0	10.61	(2)7,885,618,521.0	14.93
Other	7,738,887,147.4	26.91	12,074,820,093.9	41.89	19,611,162,921.9	49.06	18,772,110,001.0	34.93	28,288,214,102.0	60.44	19,996,759,577.0	37.85
Total	28,757,436,532.2	100.0	28,824,244,608.9	100.0	39,975,637,902.7	100.0	53,739,656,368.0	100.0	46,804,235,297.0	100.0	52,833,681,835.0	100.0

Note: Includies customs office Songkhla, Had Yai airport, Padangbesar, Sadao, Pattani, Narathiwat, Takbai, Sungaiko-lok, Betong, Satun and Pakbara.
Complied by: Southern Development Centre
(1) = Goods exported through customs office no. 1
(2) = Goods exported through customs office no. 2
(3) = Goods exported through customs office no. 3
Source: Bank of Thailand, southern branch

5. ICT DEVELOPMENT STRATEGY IN THE SOUTH: A CASE OF PHUKET

5.1 Background

Development strategies by utilizing ICT may become an effective measure to make regional economies active. Indeed, the establishment of an ICT city as an economic growth centre with intelligence-intensive industry or businesses will contribute to regional development. In southern Thailand, Phuket has been nominated as an ICT development centre.

The Andaman coast provinces, especially Phuket, have played a vital role in the tourism industry of Thailand. Over the past several years, this area has brought in more than 50,000 million baht. The Thai Government has emphasized the development of Phuket and the surrounding areas to attract more foreign visitors. For the development of a KBE, the Government has set up an Action Plan (1999-2011) to develop Phuket as an international city by making use of ICT. The Government's strategy for ICT development is called the Greater Phuket Digital Paradise Project. It aims at facilitating the Greater Phuket area, which includes Phuket and its four neighbouring provinces of Krabi, Phangnga, Trang and Satun, which share the coastline along the Andaman Sea.

The National Electronics and Computer Technology Centre under the National Science and Technology Development Agency has the responsibility to implement the strategy in cooperation with the NESDB, Phuket Provincial Governor's Office and other related sectors (see Figure 5.1).

5.2 Objective and Targets

The objective of the Greater Phuket Digital Paradise Project is to enforce international competitiveness in business and industry through the promotion of ICT service, e-business, investment in the software industry and e-government. The project must also take into consideration natural resources and environmental issues.

The main purposes are summarized as follows:

(1) Developing the ICT service sector and promoting investment in ICT-related businesses and industries.
(2) Promoting and supporting the tourism industry in harmony with the environment.
(3) Facilitating the utilization of ICT in local businesses, enterprises and by people in general.
(4) Building ICT knowledge and telecommunications capacities.

The ICT-development plan of Greater Phuket pursues Thailand's strategy for strengthening ICT knowledge in local areas to decrease the digital divide. The targets for achievement within five years is as follows:

(1) Efficient information infrastructure.
(2) International-level standardized services with reasonable pricing.
(3) The founding of an international ICT institute that will support the activities of the public and private sectors, such as international conferences and exhibitions.
(4) Industry and business development in ICT.

a) Information technology for the tourism industry (e-tourism).

In order to enforce the tourism industry in Greater Phuket's international market, the active utilization of ICT is encouraged. This is exemplified as follows: 1) creating a Call Centre for customer service and a portal site for providing travel information and 2) encouraging the use of the Internet among local entrepreneurs for expanding the market.

b) Software industry and e-commerce development.

E-commerce is expected to expand business activities, develop human resources and strengthen R& D within industries, such as the software industry.

Development guidelines are as follows:

i Promote investment in software industries, especially in the field of education and tourism.
ii Develop human resources in the software industry to increase the ICT worker force and re-train of teachers and instructors by using new media technology.
iii Strengthen of e-commerce of small and medium enterprises through tax incentives.

iv Train potential users of e-commerce.

v Promote R&D activities in the private sector with financial and technical support.

vi Create a provincial information centre that holds databases for SME and transportation businesses.

vii Promote ICT business investments, such as Application Service Provider (ASP), Internet Data Centre (IDC), e-Auction Facilities, Virtual Trading Market,Data Processing Service and Payment Gateway.

c) Information technology for entertainment business development (e-entertainment).

A new business related to entertainment may have a strong potential in Phuket because of the large number of tourists each year. Development objectives are as follows:

i Creating a Multimedia Centre, which has facilities such as Digital Video and Music Digital Studio, a Digital Entertainment Theme Park, Video Games Production Centre and a Marine Biology and Environmental Study Centre.

ii Creating a Digital Innovation Centre as the heart of KBE for developing new technology.

d) Information technology for educational development (e-education).

To develop Phuket as an education centre, increased diffusion of Internet service and strengthening of ICT skills is required to corre spond to market demand. Development guidelines are as follows:

i Promote the utilization of the Internet and SchoolNet in every school and district in order to enrich ICT knowledge.

ii Develop capacity as an educational centre.

Human resource development is the most fundamental and important factor for ICT development. For establishment of an education centre, the following should be examined:

(a) ICT and Multimedia International University

(b) Virtual University for self-directed study

(c) Andaman Advance Science and Technology Centre for supporting R&D in high-tech science and technology

(d) Regional ICT and Multimedia Training Centre for new graduates, SME, workers and unemployed workers
(e) English training institute to utilize Internet information
(f) Technology Training Centre for the private sector with ICT-certification programmes
(g) Foreign cooperation in the ICT field

5.3 Projects in Progress

Representative ongoing or planning projects are as follows: (Some projects have been implemented with foreign cooperation.)

1) One-Stop Service Centre

This project started in 2002. The One-Stop Service Centre aims to enhance public services through cooperation between central and local government agencies in applying ICT. One-stop facilitation means to provide investment information and consulting services as well as online services for visas and work permits. The desired result is to attract foreign investors. Relaxing regulations on visas and work permits is required.

2) ICT Development of the Local Administration

This project aims to develop information systems and the capabilities of the administrators in the provincial and local government offices. ICT training has been implemented in order to promote ICT utilization of management and civil service.

3) Phuket Xyber English Project

This project is one of the pilot projects under the cooperative effort of the British Council, Phuket Vocational College and NSTDA Online Learning Project (NOLP). It aims at teaching English for travel businesses through ICT. The period of the pilot project is three months from January 2003; afterward, it is planned to extend to the Phuket Hotel Association and schools.

4) ICT University Project

This project aims to establish an independent and multidisciplinary institute of ICT in cooperation with the private sector. The University Committee has approved the proposal for its establishment, but the project has been suspended due to budget constraints. ICT universities, such as the Multimedia

University in Malaysia, should be established in order not to lose touch with the advent of a KBE.

5) The Andaman Environmental Resource Information Network (AERIN)

The AERIN project aims to develop an information database system on environmental issues. Beginning in 2001, the environmental database has been developed in cooperation with the Canadian International Development Agency (CIDA) and representatives from the ICT Development Committee in Phuket. It is expected to broaden available information on environment and security issues.

6) SchoolNet for Phuket, Phang Nga and Krabi

This project aims to improve the quality of education in the region through the use of computers and an Internet network for education and self-learning under the cooperation of NECTEC and ISP from 2003 to 2004.

7) Management Information System (MIS) Project

The MIS Project aims to develop the storage of data and information jointly at local government offices that will contribute to better management and services. Data to be collected includes information on the development and planning of local infrastructure and public utility systems, taxation mapping and environmental preservation issues. So far, the data contains general information about Phuket and neighbouring provinces, a directory of high-level administration officers, the Phuket development plan and important laws and regulations.

8) Geographic Information System (GIS) Project

The GIS Project involves the collection and dissemination of spatial data. As a geographic database, information of streets, sewers, buildings and government areas has already been stored in the Digital Evaluation Model. The related information includes waterway and water resources collected by NECTEC. As for the software, the GIS Project uses the Minnesota Map Server, which is open to public use, under the cooperation of the Faculty of Engineering at Chulalongkorn University.

Apart from the above-mentioned projects, ICT training has been implemented in Phuket with support from universities, the central and local governments and the private sector (see Table 5.4). It may be said that qualified ICT manpower depends on the success of the Greater Phuket Digital

Paradise Project together with the improvement of the information infrastructure under government initiatives.

5.4 Issues for Development

As one of the regional development strategies in Thailand, the idea of an ICT-based city is now in consideration with a view to placing the core in the southern region. The strategy comes from preparing information infrastructure, focusing on job creation by inviting foreign companies and enhancing domestic software industries' competitive power.

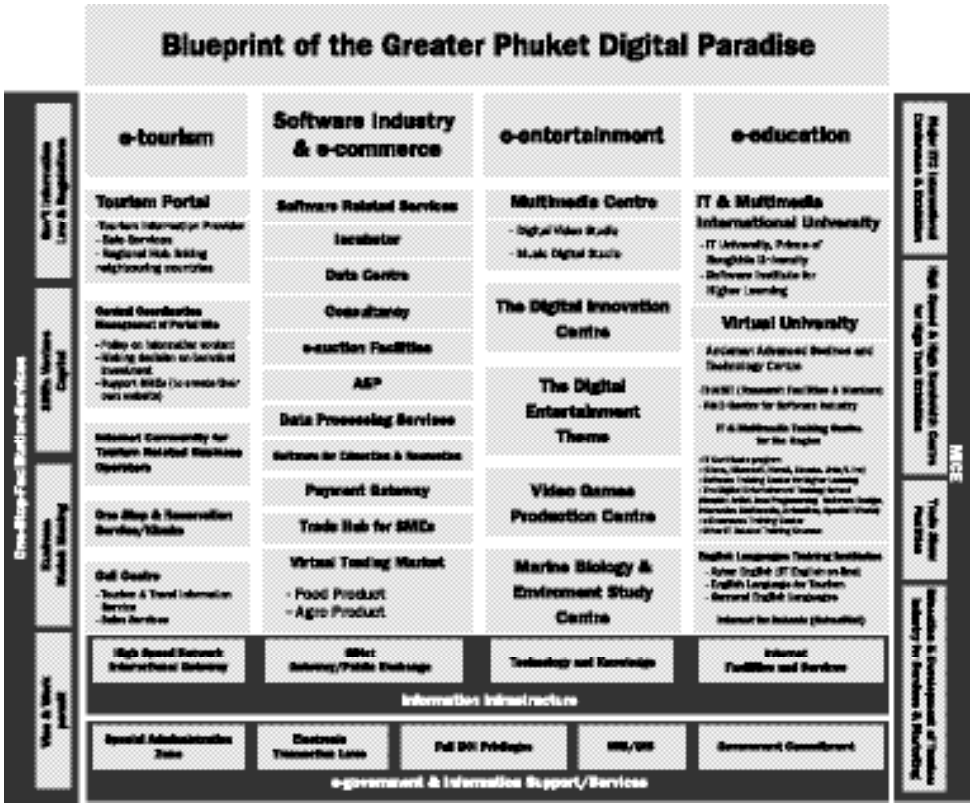
Aademic, business and governmental circles, including the Phuket Chamber of Commerce members, private organizations such as the Industry Promotion Committee, Prince of Songkhla University, NECTEC, government organizations and others are working together to provide information to ICT-related companies interested in investing in Phuket. They promote the One-Stop Service and ICT-related human resource development.

Reducing the over-concentration in Bangkok and the regional ICT gaps would contribute greatly to the Thai economy and help create the core of a regional economy. Phuket, a tourism centre, is expected to become an ICT-based city with the future completion of the telecommunications infrastructure, etc.

Surrounding areas of Phuket, which are close to Malaysia, have a wealth of natural resources and have the possibility to act as a gateway for trade and investment with neighbouring countries. It is also expected that the Phuket Digital Paradise Project will contribute to regional development, particularly in transportation infrastructure expansion.

The main reason why Thailand lags behind Singapore and Malaysia in development and diffusion of ICT, such as the Internet and e-commerce, is that the government ICT initiative is not very aggressive. People supporting the Phuket Digital Paradise Project have asked the Government to simplify the procedure for visas and work permits, but the proposal is being blocked by the Administration. The Digital Paradise plan could be left unfulfilled if there is not sufficient commitment by the Government.

Figure 5.1: Concept of the Greater Phuket Digital Paradise Project



Source: NECTEC

Table 5.1: ICT Training Courses in Phuket

No.	Budget year	Description/training course	Target	Number (person)	Support finance	Remark
1	1998	Open Source Software seminar	Interested person	143	Phuket University	
2	1999	Linuk manual	General	20	Register fee	
3	1999	Create Web Page by HTML	General	19	Budget (economy stimulate)	
4	1999	Microsoft Word 97 for Windows 95 group 1	Unemployed	30	Budget (economy stimulate)	
5	1999	Microsoft Word 97 for Windows 95 group 2	Unemployed	30	Budget (economy stimulate)	
6	1999	Microsoft Word 97 for Windows 95 group 3	Unemployed	31	Budget (economy stimulate)	
7	1999	Basic PC Hardware	Unemployed	27	Budget (economy stimulate)	
8	1999	Microsoft Excel 97 for Windows 95 group 1	Unemployed	30	Budget (economy stimulate)	
9	1999	Microsoft Excel 97 for Windows 95 group 2	Unemployed	30	Budget (economy stimulate)	
10	1999	Microsoft Excel 97 for Windows 95 group 3	Unemployed	27	Budget (economy stimulate)	
11	1999	Study and plan for IT development project for develop Phuket (train representative who join pilot project MIS/AIS)	Phuket government officer	82	National Technology Electronic & Computer Center	
12	2000	Linux sis program installation according to SchoolNet project	Secondary school teachers in Phuket	50	Phuket General Education	Held with Phuket General education
13	2000	Computer training for IT management group 1	Management/chief	35	Register fee	
14	2000	Computer training for IT management group 2	Management/chief	34	Register fee	
15	2000	Computer training for IT management group 3	Management/chief	29	Register fee	
16	2000	Computer training for IT management group 4	Management/chief	28	Register fee	
17	2000	Basic Internet training group 1	General	15	Budget/register fee	
18	2000	Basic Internet training group 2	General	7	Budget/register fee	
19	2000	Microsoft Office (Excel) training project	General	30	Budget/register fee	
20	2000	Basic Unix administrator	Aviation Control personnel, Phuket	13	Budget/register fee	
21	2000	Basic Windows NT administrator	Aviation Control personnel, Phuket	13	Budget/register fee	
22	2000	Basic Home Page use HTML	General	19	Budget/register fee	
23	2001	Computer for Bangkok Bank's staff group 1	Bangkok Bank personnel, Phuket	26	Bangkok Bank, Phuket	
24	2001	Computer for Bangkok Bank's staff group 2	Bangkok Bank personnel, Phuket	24	Bangkok Bank, Phuket	
25	2001	e-commerce with new business seminar	Representative/ general/ undergraduate	207	Income	
26	2001	Basic Microsoft Excel	General	10	Register fee	
27	2001	Basic computer	General	12	Register fee	
28	2001	e-commerce group 1	General	36	Budget (economy stimulate)	
29	2001	e-commerce group 2	General	35	Budget (economy stimulate)	
30	2001	e-commerce group 3	General	35	Budget (economy stimulate)	

Table 5.1: ICT Training Courses in Phuket (continued)

No.	Budget year	Description/training course	Target	Number (person)	Support finance	Remark
31	2001	Assemble and fix computer group 1	General	42	Budget (economy stimulate)	
32	2001	Assemble and fix computer group 2	General	40	Budget (economy stimulate)	
33	2001	Assemble and fix computer group 3	General	40	Budget (economy stimulate)	
34	2001	IT innovation 2001 (IT@Phuket Day no. 1)	Youth and general	1,500	Phuket Administration organisation/Phuket university	
35	2002	Create basic computer	General	4	Budget/Register fee	
36	2002	Basic computer and Microsoft Excel	General	11	Budget/Register fee	
37	2002	Basic Internet	General	23	Budget/Register fee	
38	2002	Unix Administration	Aviation Control personnel, Phuket	11	Register fee	
39	2002	Operate develop database training project for Phuket development	Phuket government officer	40	Phuket government officer development center	
40	2002	Basic Homepage	General	24	Budget	
					Total Expense	

Total for course and computer attendance (excluding seminars)

Year	Attendance	Course	Used budget (baht)
1999	326	10	930,000
2000	273	11	251,300
2001	300	11	1,841,500
2002	113	6	145,000

Note: For the budget year 2002, training decreased because of budget cuts and there were not enough teachers. More undergraduates used the computer operation room.

Source: Prince of Songkhla University

6. CONCLUDING REMARKS

As one of the regional development strategies in Thailand, the idea of an ICT-based city is now in consideration with a view to placing its core in the southern region. There is attention toward information infrastructure focusing on job creation by inviting foreign companies to invest the region and enhancing domestic software industries' competitive power.

In the South, ICT-based development in Phuket and surrounding areas are expected. Academic, business and government circles, including the Phuket Chamber of Commerce members, private organizations such as the Industry Promotion Committee, Prince of Songkhla University, NECTEC, governmental organizations and others, are engaged in providing information to ICT-related companies interested in investing in Phuket.

The problem, however, is that the communications infrastructure is not yet mature. In addition, Phuket has only one university, Prince of Songkhla University – Phuket campus. In the future, it will be necessary to establish institutions like an ICT training centre and to invite ICT professionals.

Phuket has strong potential to become an ICT city. ICT-related European/American companies have already established branches in Phuket, albeit still on a small scale, because of comparatively better transportation, infrastructure and economic inducements and the existence of some international schools.

A major obstacle for regional development is the commitment of the Thai Government. In Thailand, the government ICT initiative has not been strong enough; the economy has been driven by the private sector up to now. However, with the intention of developing a KBE, the Singaporean and Malaysian governments have strongly accelerated ICT within their respective countries. It is therefore necessary for the Thai Government to enhance its ability to implement relevant policies, so that Thailand will not be left further behind in its ICT capabilities. In Phuket, for example, the regulations regarding visas and work permits for foreign ICT-related engineers could be relaxed to encourage more active development of the industry. It is up to the Government to determine if Phuket will become an ICT city, comparable with Singapore, or stay in a position as just a tourist destination.

As mentioned, southern Thailand's industrial infrastructure depends on resources such as agricultural products, fishery, rubber, etc., which are not easily conducive to industrial development. However, considering the area's geographic advantages in being positioned near Malaysia, Myanmar and South Asia, there is a good chance for it to become a gateway for trade and investment within a regional framework such as the Indonesia-Malaysia-Thailand Growth Triangle.

In addition, the growth of the Chinese economy can be considered an opportunity for Thailand to expand its farm-product exports. As a production centre for processed foods, the South should plan a market strategy through development of logistics utilizing ICT, such as the Electronic Data on Interchange.

Singapore installed its own EDI system, called TradeNet, more than ten years ago and now conducts trade online. With EDI, traders can follow all necessary procedures online for the import/export and transfer of cargo to third countries, e.g., customs declaration, license issuance and payment of customs duties and consumption taxes.

In Thailand, although Sadao, a checkpoint on the Malaysian border, has already installed an EDI, Songkhla Harbour has not yet done so, and the trade network (customs clearance, ports and harbours) is not yet complete. Phuket's excellent geographic location, the installation of an EDI and the area's development as a gateway to Malaysia and neighbouring countries needs to be encouraged.

ICT-related human resource development is keenly required. In the South, the shortage of engineers shall be a hindrance for economic growth. Most people who graduate from engineering faculties in universities in the South hope to go to the Bangkok metropolitan area for employment. To avoid that situation, Japanese cooperation in upgrading IT literacy in the region may contribute to the improvement of the shortage of IT-literate human resources. At the same time, it will be necessary to increase job opportunities by establishing an industrial zone, such as an Industrial Cluster, together with the establishment of ICT-related higher education and sufficient training programmes. To effectively develop a knowledge-based economy requires not only good geographical conditions and a wealth of natural resources, but human resource development is greatly needed as well.

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