

Chapter 6 Toward A Knowledge-Based Economy: Northeastern Thailand

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Chapter 6

TOWARD A KNOWLEDGE-BASED ECONOMY: NORTHEASTERN THAILAND

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1. THE ECONOMIC SITUATION AND THE LABOUR MARKET

Geographically, Thailand's northeast region is a plateau sloping downward from west to east. There are three major rivers – Mae Kong, Chi and Mun – flowing eastward and creating three major basin areas. The region occupies about 16.88 million ha, or around one third of the whole Kingdom.

Land utilization in the region can be divided into four major types: 1) cultivation, covering about 9.23 ha; 2) housing, covering about 0.8 ha; 3) forest, covering about 2.16 million ha; and 4) mountain, road and unclassified area, covering about 2.16 million ha. Within 9.23 million ha of the cultivated area, only 0.77 million ha, or about 8.3 percent, is irrigated; the remaining portion, three fifths of which is paddy land, is rain fed. The other one fifth contains fruit trees, vegetable, grassland and idle land.

1.1 Social Issues and the Economy

The Northeast is the most populous area of the country with a population of about 20 million, or one third of the national total. Around 40 percent of the population resides in four major cities: Khon Kaen, Nakorn Ratchasima, Udon Thani and Ubon Ratchathani. Population growth during the past five years was about 0.8 percent per annum.

The region is characterized as agricultural. About 76 percent of the population engages in agriculture and is dependent on only a few crops: rice, cassava, maize and sugar cane. As most of the area for cultivation is sandy soil and influent by a large variation of rainfall, the crop yields and productivity rank the lowest in the country.

Consequently, the Northeast is the poorest region in terms of per capita income, which leads to a huge portion of the labour force moving to Bangkok and other urban areas, as well as abroad. Although the movement of labour generates more off-farm income for their families, it also brings social problems to the region. Elderly people and children have been deprived, especially those living in rural areas.

In terms of gross regional product, the Northeast ranks the third largest economy, after the eastern region and Bangkok Metropolitan area. The Northeast's GRP contributes about 8.9 percent of GDP of the country's. During the past ten years, the Northeast economy grew at an average of 6.2 percent per annum. The services sector was the fastest-growing sector with an average of 9.7 percent growth a year. The industrial and trade sectors increased by 9 percent and 6.2 percent, respectively, each year while the agricultural sector grew more slowly at a rate of 3.8 percent per year.

The Northeast economy is mainly dependent on agriculture. In 2000, this sector contributed about 21.9 percent to the GRP. Trade and services sectors contributed 17.9 percent and 14.8 percent, respectively, while the industrial and construction sectors added about 16 percent and 4.1 percent, respectively. Also during the past ten years, there were noticeable changes in the Northeast's economic structure. The non-agricultural sector grew rapidly and became a more important source of income, while agriculture showed minor changes. Consequently, agriculture's share in GRP in 2000 declined to 21.9 percent, compared with 33.2 percent in 1990; the non-agricultural sector increased to 78.1 percent in 2000 from 66.8 percent in 1990.

Commercial banks are the major financial institutions in the Northeast in terms of the number of branches, deposits and lending. The number of branches account for more than half of all financial institutions operating in the region and the amount of deposits and lending represent about 80 percent of the regional total. Other financial institutions operating in the Northeast are the Government Saving Bank (GSB), Government Housing Bank (GHB), the Bank for Agriculture and Agricultural Cooperatives (BAAC), the Industrial Finance Corporation of Thailand (IFCT), the Small-Scale Industrial Finance Corporation of Thailand (SIFCT) and the Finance and Securities Company. These institutions however, play a minor role in the Northeast economy

1.2 Barriers for Development

- 1) The region's natural resources endowment is unfavourable and most of the soil is inferior. One third of the land is saline contaminated, making it unsuitable for growing crops. Water resources are not sufficient; irrigation is possible for only 8.3 percent of the farm land. Although rainfall averages are not much different than in other regions, the seasonal duration and distribution of rainfall varies considerably each year. There has been an immense degree of deforestation, and remaining forests comprise only 14 percent of land in the region.
- 2) The region's economy depends heavily on the agriculture sector, mainly crop production. However, prices of the major crops fluctuate heavily. In addition to the low productivity, personal farm income is low and unstable each year. The majority of people are poor – in 1992, one third of the Northeast population lived below the poverty line. Income inequality within the region as well as income distribution in relation to the rest of the country, have been growing worse over the years. Income distribution measured by the Gini Coefficient increased from 0.426 to 0.445 in 1992.¹ In 1993, per capita income of the people in Bangkok Metropolitan area was 11 times greater than income per capita in the Northeast. Moreover, a study of the poverty problem during the economic crisis by Isara Sarntisart, published in Sept.1998, Thammasart Economic Journal, pointed out that the problem of income distribution, especially poverty incidence in 1998, substantially worsened in all regions of Thailand because of the financial crisis.
- 3) The Northeast economy has a dual character. Regional development mainly concentrates in the major cities of Khon Kaen, Nakhorn Ratchasima, Udon Thani and Ubon Ratchathani. Consequently, there is far less development in the small cities and rural areas, and that has led to a wide gap in the standard of living between rural and urban people. Government and private sector investments as well as Foreign Direct Investment (FDI) are generally clustered in the major cities.

¹ Theoretically the higher number of Gini Coefficient means income distribution is getting worse.

- 4) There is high mobility of the labour force in the region. During 1990-1995, the region lost about 420,000 workers to other regions. Out of this, 60 percent migrated to Bangkok Metropolitan area in both seasonal and permanent patterns. Moreover, about 200,000 workers moved abroad to work.

1.3 The Northeast Economy During the Financial Crisis

The economic crisis that began in 1997 hit the Northeast the hardest, although it has been mitigated somewhat by good conditions in the agriculture sector. Rice, sugar and cassava prices have been high, and rainfall has been good. Some prices have been the highest on record, such as for jasmine rice.

With a lack of financial liquidity as the major problem, the impact was hardest in the major cities, especially in the construction, property, automotive, retail, local manufacturing and services sector.

The relative bright spots were few and confined mainly to rural areas. The worst-hit areas were construction and property. Real estate development collapsed. This had a domino effect on production of building materials, ceramics and consumer goods. Banks stopped credit lines and that halted many projects. As a result, there are a lot of half-finished housing, commercial and retail projects. Despite the positive effect of the country's foreign tourism, there were few tourists and domestic visitors travelling in the Northeast. Hotel occupancy rates averaged 30 percent.

The picture in the retail commercial market was mixed. Sales of basic goods, such as food and cheap clothing, at supermarkets largely held up; but higher-priced lines and department stores experienced a sharp drop in sales. While retail sales at the Big C hypermarket in Khon Kaen declined only by 5 percent, in Nakhorn Ratchasima, department store sales fell by 30 percent. Sales of branded luxury goods, designer clothes and imported cosmetics fell at least 40 percent. There was a sharp decline in sales of new cars and motorcycles. The automotive service and repair industry was also hit. And farmers are reportedly still purchasing second-hand machinery and vehicles.

There was considerable impact in the services sector. In addition to fewer tourists, the hotel sector was affected by the Government's budget cuts in

conducting seminars, which was a major source of hotel income. Entertainment industries were greatly affected, although ballroom dancing establishments remained popular. In Nakhorn Ratchasima, the private medical care service experienced a slowdown in clients. People turned away from private hospitals to cheaper services provided by public hospitals. At Khon Kaen University, the number of students requesting student loans doubled and many others requested delays for payment of fees.

Excluding exported products, regional manufacturing activity is well down. In the export market, there has been some expansion of production, such as in electronics components, clothing and footwear in Nakhorn Ratchasima province and furniture, textiles, garments and processed food in Khon Kaen province. Major markets are Japan and Taiwan for food and Europe and the US for manufactured items.

Overall, new investment slowed considerably in the Northeast. According to the BOI, new project approvals fell 11 percent in number and 41 percent in value in the first half of 1998. In Khon Kaen, new investment was non-existent as traditional investors in the area are locals. However, a few foreign joint-venture projects locating in Nakorn Ratchasima.

Socially, the impact on employment was not a serious problem as workers laid off in Bangkok Metropolitan area were welcomed home by rural-based extended families. Even those who lost jobs locally reportedly managed to find sufficient work in agriculture. For example, according to a field survey by the Bank of Thailand's northeast office, more than 500 of the 600 workers laid off by a vehicle-parts manufacturer in Nakhorn Ratchasima were re-employed by the agriculture sector.

However, in terms of numbers, there were an estimated 700,000 people unemployed in the agricultural sector and 98,000 people left unemployed in the manufacturing sector. Some 120,000 people were estimated to have returned to the Northeast by April 1998.

In general, there were few business closures in the region. This was attributed to the fact that many are family businesses. Reportedly, the number of laid-off workers was fewer than it could have been because many businesses adopted a "community" approach, seeking to look after employees where possible. Only the export industries hired new workers. Businesses cut other

costs instead of workers such as use of utilities, overtime and operating hours. Despite claims of low unemployment, there was certainly substantial underemployment in the region. The number of roadside vendors and self-employed operations increased in the cities as displaced workers from Bangkok sought subsistence income.

The major economic problems were lack of financial liquidity, purchasing power and high interest rates. Banks greatly reduced credit provisions: Businesses could not obtain capital and consumers couldn't obtain credit. New credit declined 2.9 percent in the first half of 1998. And bank head offices removed the discretionary power of branch managers to approve new credit.

The decline in new credit extensions resulted in worsening liquidity problems. Non-performing loans (NPL) were as much a problem for Northeast banks as elsewhere, and estimates of NPL were generally higher than the national average. Much of the credit previously extended was wasted on "binge consumption" or poor investments in property or stocks.

Another major cause of economic problem identified by regional business was the reduction in new government investment and constraints of government spending, which affected town-based businesses. This was particularly evident in Khon Kaen, which is an administrative centre and relies heavily on government activity. Businesses in Khon Kaen reported that the Government had virtually ceased all projects. This had considerable repercussions on the economy.

The most common demand to the Government is for liquidity to be pumped into the system though the combination of financial sector activity and fiscal measures. Businesses demanded that the Government re-negotiate with the International Monetary Fund (IMF) to remove tougher bank-provisioning requirements, which were preventing banks from offering new loans. They also called for interest rates to be lowered. On the fiscal side, businesses called for accelerated payment of government debts, increased government investment expenditures and lower taxes. It was also thought that the Government should play a more active role in facilitating debt restructuring between debtors and creditors.

The Government, therefore, implemented several programme to minimize the impacts from the crisis. Within the Northeast, three major projects aimed

to create jobs: 1) liquidity support for SMEs by the IFCT, BAAC, GSB, GHB and the BOT; 2) the Social Investment Project; and 3) the Miyazawa Plan. By the end of 1999, the first projects extended about 26.755 million baht to 5,204 SMEs in the region; the SIP project provided about 1,809 million baht for 585 small-scale irrigation projects benefiting about 66,500 farmers.

At the same time, regional measures to increase government spending to stimulate the region's economy under the Miyazawa Plan were allocated about 12,159 million baht (22.9 percent of the total fund); of that, about 59 percent targeted job creation, about 9 percent went for education and 8.7 percent went for improving public health services. The remainder was allocated to other social activities.

1.4 The Northeast Economy in 2002

As seen in Table 1.1, the Northeast economy in 2002 showed improvement and had expanded by 4 percent compared to 2001. This was due mainly to an increase in private spending. Major indications included increased sales of cars and motorcycles and increased electricity usage – especially by businesses and industry, which indicates there was more investment and expansion in production. The construction sector started to expand again in 2001, as indicated by an increase of the number of permit applications for construction projects in municipal areas. The lending rate maintained at a low level but yet was favourable for investment. Commercial bank's credit expanded by 9.6 percent; however, deposits increased at a lower rate of 0.9 percent. The inflation rate maintained only at 1 percent compared to 1.2 percent in 2001. Remittances from labourers working abroad decreased 13.3 percent from the year 2001.

Table 1.1: Key Economic Indicators for the Northeast

Indicators	1998	1999	2000	2001	2002
Economic growth rate	-7.9	1.2	2.2E	3.0E	4.0E
Inflation rate	8.3	0.1	1.3	1.2	1.0
CB deposit	2.3	-4.1	11.6	5.1	0.9
CB Credit	10.1	-6.5	-17.2	-11.0	9.6

E = Estimated

Source: BOT Northeast office

Factors affecting the Northeast's economic recovery have been the high price of world oil, which affects the cost of production of various goods, and a drop in sugarcane prices. Because of the many NPLs, financial institutions still apply strict measures in providing credits to new businesses.

Agriculture Sector

In 2002, overall agricultural products in the Northeast were expected to decrease by 0.1 percent from the previous year due to the decreasing plantation of rice and maize because of the drought in the early period of the crop season and the flooding before harvesting. However, sugarcane and cassava were not affected and so production of both crops increased from 2001. Prices of rice, cassava and maize increased, whereas the price of sugarcane declined.

Non-Agriculture Sector

Growth in the non-agricultural products was expected to increase by 5.1 percent because of expansion of private-sector expenses. Sales of cars and motorcycles increased by 47 percent and 38.5 percent, respectively. Electricity usage was 7 percent higher than in the year 2001, mostly due to production expansions in businesses and industry, especially in the construction and services sectors.

Construction sector

The construction sector experienced recovery, especially with government projects, such as the National Housing Project and office buildings. Most of the private sector projects were commercial buildings, such as department stores in Nakhorn Ratchasima and Ubon Ratchathani. The permitted construction area increased by 43.7 percent, and the value of land being purchased increased by 33.9 percent. Financial institutions restarted supporting loans for housing and offered low interest rates.

Price Index

In 2002, the consumer price index dropped to 1 percent compared with 1.2 percent in 2001. While the price of food and beverages increased by 0.4 percent, the price of non-food products decreased by 2.9 percent.

Employment

There were 92,579 job vacancies in 2002, an increase of 29 percent from the previous year; however, only 12,466 people were placed, which was a decrease of 11.5 percent compared to 2001. Some 108,274 labourers went abroad to work, a decrease of 2.6 percent compared with the previous year. The majority of labourers came from Ubon Ratchathani, Nakhorn Ratchasima and Khon Kaen provinces.

Financial Sector

By the end of 2002, commercial banks' savings increased by 0.9 percent while credit was recorded as increasing by 9.6 percent with loans mainly extended to the housing and industrial sectors. About 74.4 percent of commercial banks' deposits were extended as credit in the region. Commercial banks still applied strict measures in giving loans to the new customers.

Available credit came from the BAAC and the Government Housing Bank (GHB), which increased about 5.2 percent and 23.6 percent, respectively, from 2001. However, credit from the IFCT and the Small Scale Industrial Finance Corporation of Thailand (SIFCT) dropped by 7 percent and 16.7 percent, respectively, from the year 2001.

Remittances From Northeast Labourers Working Abroad

From salaries earned abroad, workers sent to the Northeast around 29.5 million baht, a decrease of 13.3 percent over 2001. This was due to a decrease in the earnings of labourers abroad, especially in Taiwan.

Tax Collections

Tax collections in 2002 increased by 15.4 percent; revenue tax grew by 16.9 percent due to an increase of personal income tax and business income tax, which were recorded up from 2001 by 22.8 percent and 15.6 percent, respectively. The interest earnings tax decreased by 12.8 percent because of the low interest rate. Excise tax was up by 6.4 percent. This was because the liquor tax was up by 6.1 percent, and the beverage tax was about two-fold higher by the expansion of operations.

Thai-Lao PDR Border Trade

Trade value with Lao PDR was recorded at about 19 million baht, a decrease by 10.3 percent. Imports from Lao PDR amounted to 3.745 million baht, a decrease of 3.7 percent due mainly to a drop of plywood imports. Exports to Lao PDR were recorded at 15.26 million baht, a decrease of 11.8 percent due to strict measures of the Lao Government and competition from the low-priced consumer goods from China and Vietnam in the Lao market.

Labour Market

By May 2002, the population in the Northeast was 21,284,958, of which 72.2 percent (15,363,121 people) were older than 15. The total supply of labour was 10,659,558 people, or about 51 percent of the total population. Seasonal waiting labour forces numbered 578,256 people, and current labour forces were 10,081,742 people; of them, 94.8 percent (9,557,893 people) were employed, so unemployment was about 5.2 percent (see Table 1.2).

Table 1.2: Northeast Labour Forces in 2001

	Persons	%
Total population	21,284,958	100
Population older than 15 years	15,363,121	72.2
Labour force	10,695,998	50.9
Seasonal waiting labour force	578,256	2.7
Current labour force	10,081,742	100
Employed labour	9,557,839	94.8
Unemployed labour	523,904	5.2

Source: Northeast Employment Survey March-April 2001, NSO

About 41.7 percent, or 6.4 million people, of the Northeast population older than 15 has not completed primary school. About 4 million people have completed primary school, and another 2.2 million people have graduated secondary school. Only 829,736 people, or 5.4 percent, have a university degree (see Table 1.3).

Table 1.3: Population Older Than 15 years in the Northeast, Classified by Education Level

Education level	Persons	%
Total number	15,363,121	100.0
Uneducated	524,490	3.4
Lower than primary school	6,404,351	41.7
Primary school	4,000,475	26.0
Secondary school	2,257,557	14.7
High school	1,342,837	8.7
University	829,736	5.4
Other & unclassified	3,694	0.1

Source: NSO

The Northeast labour force was mainly employed in agriculture, followed by wholesale/retail trade, manufacturing, construction and the hotel and restaurant industry. The majority of the employed persons were self-employed or doing personal business. Table 1.4 provides the numbers of employees of private firms and household enterprises.

Table 1.4: Employment by Sector in 2001

Sector	Persons	%
Total labourers employed	9,557,839	100
Agriculture	4,401,506	46.1
Wholesale/retail trade	1,367,870	14.3
Manufacturing	1,181,924	12.4
Construction	821,932	8.5
Hotel & restaurant	440,516	4.6
Others	1,344,091	14.1

Source: Northeast Employment Survey March-April 2001, NSO

In 2001, according to the Ministry of Labour, there were 71,793 job vacancies in the Northeast. While job applicants numbered 38,429, job placement was 14,091 positions. In terms of numbers, lower-educated employees were in greater demand than more highly educated workers and were placed at a higher rate. The number of job applicants who had graduated vocational school and university was higher than the available positions and job placement occurred at a lower rate. In addition, the labour market in the Northeast needed workers in the 18- to 24-year-old age group (see Tables 1.5 and 1.6).

Table 1.5: Job Vacancies and Placement in 2001, Classified by Education Level

Education level	Job vacancies	Job applications (1)	Job placement (2)	% (2)/(1)
Lower than primary school	4,630	432	112	25.9
Primary school	23,998	5,873	3,030	51.9
Secondary school	10,916	5,484	2,635	48.0
High school	7,560	6,341	2,565	40.5
Vocational school	10,967	12,546	3,951	31.5
University	4,248	7,740	1,797	23.2
Unclassified	9,474	49	-	-
Total	71,793	38,429	14,091	36.7

Source: Northeast Labour Information Centre, Ministry of Labour

Table 1.6: Job Vacancies and Placement in 2001, Classified by Age of Applicants

Age of applicants	Job vacancies	Job applications (1)	Job placement (2)	%(2)/(1)
15-17	747	423	165	38.8
18-24	41,996	21,822	7,645	35.6
25-29	13,494	9,990	3,991	39.9
30-39	3,635	5,212	2,048	39.3
40-49	147	860	219	25.5
50 up	5	120	23	19.2
Unclassified	11,798	-	-	-
Total	71,793	38,429	14,091	36.7

Source: Northeast Labour Information Centre, Ministry of Labour

2. STRUCTURAL CHANGE AND INDUSTRIAL DEVELOPMENT

Structural Change

The Northeast is heavily dependent on the agriculture sector, which 20 years ago accounted for half of the region's gross production. Now, its contribution has decreased to 20 percent. Production has been adapted more into the commercial and services sectors. The industrial sector has expanded but could not be described as having a major role in the economy.

However, during the past ten years there were noticeable changes in the Northeast economic structure. The non-agricultural sector grew rapidly and became more important while the agricultural sector showed the minor changes. Consequently, the share of the agricultural sector in GRP in 2000 declined to 21.9 percent, compared with 29.5 percent in 1990 while the non-agricultural sector increased to 78.1 percent in 2000 from 70.5 percent in 1990 (see Table 2.1).

Table 2.1: Contribution of GRP by Sector

Sector	1980 (%)	1990 (%)	2000 (%)
Agriculture sector	45.3	29.5	21.9
Crop	37.2	21.1	16.5
Livestock	6.5	4.0	2.4
Fisheries	0.9	0.4	0.5
Forestry	0.7	0.2	0.2
Agricultural services	n.a.	1.9	0.9
Simple agri-processing products	n.a.	1.8	1.3
Non-agriculture sector	54.7	70.5	78.1
Mining and quarrying	0.8	0.3	0.9
Manufacturing	7.1	8.0	16.1
Construction	5.8	7.9	4.1
Electricity and water supply	0.8	1.5	2.4
Transportation and communication	4.2	4.1	6.7
Wholesale and retail trade	18.6	21.5	17.9
Banking, insurance and real estate	1.8	2.7	3.0
Ownership of dwellings	1.3	5.5	5.3
Public administration and defence	4.1	6.3	7.0
Services	10.1	12.7	14.8
Total	100.0	100.0	100.0

Source: NESDB

Financial services have expanded in parallel with the economic improvements and have played more of a role in the regional economic development. In 2000, there was a total of 507 commercial bank branches in the Northeast, mobilizing deposits totalling 253,429 million baht and providing loans totalling 173,441.9 million baht. In 1975, for comparison purposes, there were 102 commercial bank branches with deposits of 5,574 million baht and loans of 2,716 million baht. In that 25-year period, deposits increased 50-fold and loan value increased nearly 65-fold. The commercial banks released their mobilized deposits in the Northeast in the form of credit loaning at an ever-increasing rate, from 48.7 percent in 1975 to 84.1 percent in 2000.

The northeastern area and population account for one third of country's area and population, whereas the population income proportion is only one tenth, or about 11.2 percent. Since farming is the typical occupation, the Northeast is the poorest region of the country. The 2000 per capita income was only 26,317 baht, the lowest in the country. The average income was nine times lower than the average annual per capita income of the Bangkok population, which was 208,434 baht.

Farming communities dominate in the region. Because of the poverty, there are widespread problems related to nutritional deficiency, poor health, hygiene and education and lack of quality of family life. The latter case is especially becoming more and more serious owing to labour migration to work in other regions and abroad. Migrating labourers from the Northeast are the largest regional group in the country.

The regional development during the past 20 years could be said to have attained some achievement; The average annual economic growth was 6.7 percent, whereas the average inflation rate was 5.7 percent and the average annual per capita income increased seven-fold, from 2,972 baht in 1975 to 24,331 baht in 1995. The Northeast economic expansion was nine-fold, from roughly 49,902 million baht in 1975 to 498,601.6 million baht in 1995. In comparison, the national per capita increased 14 times and the national economy expanded seven times. However, after the impact of the financial crisis in terms of economic size, the northeastern economy ranked third after the eastern regions (second) and Bangkok Metropolitan area, which accounts for roughly half of the country.

Relatively much development has been achieved in agriculture. At present there are 182 large, medium and small water resources in operation in the Northeast, totalling a capacity of 3,670 million cubic metres. These water resources are distributing water to approximately 3 million rai of agricultural area. Additionally, there is 2.6 million rai of farmland receiving water from small-scale irrigation projects and power pumping projects.

Crops nowadays are more diversified than what used to be grown, which was primarily rice, cassava, kenaf, sugarcane and corn. More varieties of vegetables, fruits, perennials, rubber and grapes for wineries are increasingly being grown on suitable land in the region. Development has also been

extended to production and marketing systems, with a reliance more on contract farming. Nevertheless, productivity per rai of major crops is still low when compared to the country's and other countries' productivity. For instance, paddy produce per rai in the Northeast totals 262 kg, whereas the country's produce per rai is 338 kg.

Comparatively, the maximum productivity per rai in Australia, for example, is 1,296 kg for rice and 2.2 tons per rai for cassava. In India, rice produce is 3.6 tons per rai and corn produce is 3.6 tons per rai. In Italy, rice produce is 1,325 tons per rai and sugar produce is 7.3 tons per rai, while rice produce in Egypt is 16.5 tons per rai.

The Northeast is a world's heritage area of historical civilization and historic structures. Major tourism spots include Ban Chiang National Museum in Udon Thani province, Phra That Phanom relics in Nakhorn Panom province, Panom Rung Historic Park in Buri Ram province, Pha Taem prehistoric paintings in Ubon Ratchathani province, Pimai stone castle in Nakhorn Ratchasima province, Dinosaurs' fossil ground, and the new prehistoric tourists' spots of central Isaan in Phu Wiang district of Khon Kaen province and Sahasakhan district of Kalasin province, Phu Kradung national park and Phu Luang wildlife conservation area in Loei province and many other natural tourism sites.

The development of basic infrastructure in the Northeast could be described as appropriate. National highways now measure a total distance of 15,279 km, or 30 percent of the country's network. Railways total a distance of 1,199 km. There are eight airports providing connection to provinces, districts and other regions. Surface routes also connect the region to areas of the eastern seaboard via Nakhorn Ratchasima, to the network of roads in Lao PDR via Nongkhai and to Vietnam via Mukdahan-Sawannakhet-Danang and Nakhorn Panom-Tha Khaek-Winh routes.

Services in public health have been developed and extended to nearly all tambon, districts and provinces. There is a regional medical centre, Sri Nagarind Hospital, at Khon Kaen University. Large central hospitals are situated in major cities, i.e. Nakhorn Ratchasima, Ubon Ratchathani, Khon Kaen and Udon Thani. Other public health units are scattered in various locations to provide services to the population in general. In addition, private

hospitals were established in many provinces, such as Khon Kaen, Nakhorn Ratchasima, Udon Thani and Ubon Ratchathani.

The important and potential geological resources of the Northeast are rock salt and natural gases. However, a problem exists in the approximate 17.8 million rai of saline soil, which is unsuitable for cropping. Soil erosion occurs at a high rate, with loss of soil nutrients and soil fertility. As for water resources, although rainfall accounts for an average of 1,310 mm annually and is not much different from other regions, absorption is poor.

This results in a shortage of water resources for year-round cultivation. Forests were destroyed at a rate of 500,000 rai per year during the past 20 years, leaving the forest area covering only about 14 percent of the region. Moreover, big cities are increasingly facing environmental problems and lack of fundamental services, such as suitable waste disposal, proper sewage systems and pollution control. Problems are arising related to crowded communities and traffic congestion in certain big cities, such as Nakhorn Ratchasima and Khon Kaen. Problems are also found in the unsystematic urban expansion into fertile farmland due to lack of efficient urban planning and failure to stipulate an appropriate direction of expansion.

Generally speaking, development work in the Northeast has been progressing, but along with it three major problems have arisen:

- i.* Use of natural resources during the pre-financial crisis economic development was extravagant. Soil, water and forest resources are deteriorating at a staggering rate. More than 10 million rai of forests was destroyed in a 20-year period, reducing approximately 25 million rai in 1975 to only 14 million rai in 1995. Two million rai was encroached and turned to paddy and 4 million rai was turned into crop fields. The amount of flowing water in the Me Chi river has subsided to about 9,300 cubic meters per year; the Nam Mun river has been reduced to 21,000 cubic meters. The river water volume appears to be decreasing each year.

- ii.* Economic development has not observed the importance of equality between Bangkok and the regions, or between urban and rural areas. This results in vast labour migration to find better jobs and better opportunities. In 1996, more than 200,000 labourers migrated to work abroad. A 1995 survey by the National Statistics Office (NSO) revealed that there were 984,000 people from the Northeast migrating to work in Bangkok of the eastern seaboard. This accounted for 39 percent of the country's migration of about 2.52 million people. The trend has been increasing for migration of labour from rural areas to big cities. This has led to a lack of security at home and family separating living together in rural areas. Migration also creates other problems, such as traffic congestion, high-density communities and burdens on insufficient primary public health care services in big cities.
- iii.* Income distribution has failed to cover all areas. The population obtained low income, low education and live in poverty. The 1995 NSO survey revealed that 83 percent of the population only had completed primary education whereas in Bangkok 54.3 percent of the population had a primary level education. Farmers in the Northeast were found to have large debt. The Northeast population was poorest when compared to other regions: The proportion of poverty was 28.6 percent in the Northeast, 17.3 percent in the South, 13.2 percent in the North and 7.2 percent in the Central region. The latest survey conducted by the Office of National Social and Economic Development Committee in 1995 indicated that Srisaket was the province where per capita income was lowest in Thailand, at 18,199 baht per year. This was 13 times lower than the highest per capita income of the country of 238,849 baht per year, which was in Bangkok. In addition, the ten provinces in which per capita income was lowest were in the Northeast (listed in order of poverty): Srisaket, Nong Bua Lamphu, Surin, Yasothon, Maharakham, Nakhorn Panom, Roi-et, Buriram, Kalasin and Sakon Nakhorn.

2.2 Industrial Development

Industry is increasingly building importance in the northeastern economy. In the past, the Northeast's industries were mainly rice and tapioca mills. Currently, labour-intensive factories are becoming more and more common. There are assembling industries and subcontract production from factories in Bangkok and the eastern seaboard, such as electronics, garments, basic metallurgy, manufacture of farm products, ornaments, transportation equipment, paper and plastics. Between 1975 and 1995, the number of factories in the Northeast increased about 22 times, from 1,908 to 44,033 factories; however, 34,312 factories are rice mills.

In 2000 there were 43,747 factories with about 162,709 million baht of capital investment and about 324,490 employees in the Northeast, representing an increase from 1999 of 1.7 percent of factories, 3.1 percent of capital investment. and 5.3 percent of employees, 33,527. Of the total factories or 76.6 percent, involved food, brewery or tobacco processes. Machinery, electrical appliances and vehicle assembly accounted for 3,383 factories. There were 2,081 non-metal work and 1,206 metal work factories. The remaining produced wood products, textiles, garments, chemicals, paper and printing or other items. The majority of factories in the Northeast were small-scale enterprises and were located in Nakorn Ratchasima, Khon Kaen, Udon Thani and Ubon Ratchathani.

3. PROSPECT OF AN INDUSTRIAL CLUSTER: A CASE OF NAKHORN RATCHASIMA

Nakhorn Ratchasima province is located in Northeast Thailand, on the Korat highland at 150-300 m above sea level. It is about 255 km from Bangkok by car and 264 km by train. The province covers an area of 20,493.964 square kilometres, or 12,808,728 rai (2.5 rai = 1 acre), which is about 12.12 percent of the entire region. During 2000, the provincial administration of Nakhorn Ratchasima was divided into 26 districts, 6 minor districts, 287 sub-districts and 3,478 villages.

There are two train lines passing through Nakhorn Ratchasima province: Bangkok-Ubon Ratchathani and Bangkok-Udon Thani. There are a total of 40 train stations: 38 big stations and two junctions in the province. The main stations are in Nakhorn Ratchasima and Bua Yai junction.

There is a highway from Bangkok that begins along Phaholyothin road, becomes Highway Number 2 at Saraburi province and heads into Nakhorn Ratchasima; the Nakhorn Ratchasima-Pak Thong Chai route from Bangkok passes Min Buri district of Chachoengsao province and then Phanom Sarakham, Kabin Buri, Wang Nam Khiao and Pak Thong Chai district within Nakhorn Ratchasima. There is one commercial airport and two flights per day to other provinces.

In 2000, Nakhorn Ratchasima maintained a gross provincial product (GPP) at current market prices worth 101.911 million baht, or an increase of 6.2 percent from 1999. This increase was linked to the industrial sector, worth 26.953 million baht (21.8 percent), followed by the electricity and water supply sector, worth 2.594 million baht (13.6 percent), wholesale and retail trade sector, worth 13.117 million baht (5.7 percent), administration and control expenses sector, worth 6.918 million baht (3.7 percent) and the services sector, worth 20.106 million baht (3.2 percent).

Meanwhile, the agriculture sector recorded a decrease of 3.5 percent, or 14.593 million baht, from 1999. When considering the overall agricultural sector, it was found that plantations experienced a decrease of 4.7 percent in productivity from the year before. As well, the banking, insurance and real estate sectors recorded a decrease of 9.2 percent from the year before.

When considering the growth trends in each sector in the province, it is found that the services and industrial sector, which recorded the same growth during 1993-1999, maintains an average growth rate of 12.7 percent per year, followed by the agricultural sector with 6.7 percent growth and wholesale and retail trade with 6.6 percent growth per year.

Following the economic growth, together with a higher population by 0.84 percent, the income per of Nakhorn Ratchasima in 2000 increased by 5.2 percent to 38,647 baht, when compared to 1999. The income per capital of the province ranked 42nd in the national tabulation.

During 2000-2001, Nakhorn Ratchasima's total agriculture land measured 7.81 million rai, or about 60.99 percent of the overall area. The largest use of the land was for rice fields, occupying 4.01 million rai, followed by other crops (3.15 million rai), fruit/perennial trees (0.45 million rai), vegetables (0.19 million rai) and flower/ornamental trees (0.003 million rai).

Rice production in the year 2000/2001 was recorded at 1.7 million tons, an increase of 1.56 percent from the previous crop year. Total plantation of maize was about 997,119 rai, a decrease of 0.5 percent from the year before. Harvested area was 939,097 rai with the production of about 711,835 tons. Sugarcane produced in Nakorn Ratchasima measured about 6,226 tons, while the total product of cassava was about 3.94 million tons.

By the end of 2000, there were 7,109 factories with invested capital of about 66.485 million baht and employment of 112,358 persons in Nakorn Ratchasima. The agriculture industry accounted for the highest number of factories with 5,147, or 72.4 percent of factories. There were 228 factories in the food and beverage industry with an investment of about 15.132 million baht and employment of 7,904 workers. In the construction industry, there were 314 factories with an investment of 3.975 million baht and employment of 4,660 workers.

The transformed wood industry maintained a total of 150 factories, with invested capital of 1.080 million baht and employment of 3,857 workers. There were a total of 118 textile and garment factories with invested capital of 4.093 million baht and employment of 23,319 workers.

The chemical/plastic industry contained a total of 80 factories, or 1.13 percent of all factories in the province, with capital investment of 5.971 million baht, or 8.98 percent of total investment. Employment in those factories was 8,800 workers, or 7.83 percent of the total employment in the province.

The metal/non-metal industry contained a total of 94 factories, or 1.32 percent of all factories in the province, with capital investment of 5,170.36 million baht, or 7.78 percent of total investment. Employment in those factories was 2,432 workers, or 2.17 percent of the total employment in the province.

The services industry had the second-highest number of factories, after the agriculture industry, at 850, or 11.96 percent of the overall factories in the province. But it has the highest capital investment with 16,947.53 million baht, or 25.49 percent; employment is also the highest with 42,473 workers, or 37.8 percent of the total employment in the province.

There were a total of 128 factories in other industries, or 1.80 percent of the overall factories in the province. Capital invested amounted to 5,294.84 million baht, or 7.96 percent; 6,270 workers were employed, representing 5.58 percent of the total employment.

During 2000, there were a total of 47 projects receiving investment promotion from the BOI with a value of 4,335 million baht and employment of 12,880 Thai workers 89 foreign workers.

During the year 2001, a total of 31 projects received investment promotion from the Economic and Investment Centre, Northeastern Region I, worth 4,691.60 million baht, with the overall employment of 7,539 workers.

The tourism situation during 2000 in Mueang and Pak Chong districts had improved when compared with 1998. There were a total of 2,950,637 visitors, or an increase of 4.24 percent from 1999, including 1,729,056 tourists (58.64 percent) and 1,221,581 travellers (41.36 percent). In addition, there were 2,873,285 Thai visitors and 77,352 foreign visitors an increase of three hotels.

The province has an average population density of 124.35 persons per km. The districts with highest population density are Mueang with 568.68 persons per km., followed by Kaeng Sanam Nang with 352.35 persons per km. The district with the least population density is Wang Nam Khiao with 36.02 persons/square kilometres.

According to a 2001 Labour Force Survey (Round 1 January-March) by the NSO, Nakhorn Ratchasima has a total population of 2,663,963 persons, of which 1,937,484 persons, or 72.73 percent, are older than 15. About 97 percent of the total persons in the labour force were employed.

Most of the employed persons in Nakhorn Ratchasima were in the agriculture and forestry sectors, followed by production and the wholesale and retail sectors. Most of the employed persons worked in private firms, followed by personal businesses and household work, such as handicraft production.

There were a total of 3,928 job applicants in the province in 2000, which was a decrease of 62.28 percent from 1999. In addition, there were 5,587 vacancy positions, or a decrease of 30.28 percent from the previous year, with the overall job hiring of 947 persons, or a decrease of 67.34 percent.

Nakorn Ratchasima is a province with high potential for investment. The factors that support the potential are as follows:

Infrastructure – There are 44 electricity offices available for full services throughout the province. The province maintains a high capacity of waterworks to support higher demand, or about 47 percent of the current productivity. In addition, telephone numbers of both Telephone Organization of Thailand and Thai Telephone & Telecommunication Ltd. are available to serve investment expansion.

Transportation – There are convenient automobile and railroad transport networks, with two train lines passing through the province. And there is a commercial airport. Nakhorn Ratchasima is the transport centre in the Northeast, as well as the gateway to the region.

Workforce – The workforce represented about 67 percent of the total population in 1999. At present, the minimum wage is 145 baht per day, lower than 169 baht per day in Bangkok Metropolitan area and thus is favourable for investment, especially for agri-based industries.

Raw materials – Nakhorn Ratchasima produces the regions largest portion of important economic crops; rice and cassavas supplying the largest and the third largest portion of sugarcane in the region. The plantation areas of sugarcane ranked the third in the northeastern region. In addition, other important crops include livestock, corn and soybeans, which could be supplied as a raw material for agri-based industry.

Investment promotion – Nakhorn Ratchasima is under Investment Promotion, Zone 3, eligible for many BOI privileges. Enterprises in agricultural industry and agricultural product industry receive special promotion from the Government, in accordance with the announcement on 1 August 2000 regarding the policy on new investment promotion. Further development of the industrial zone in Nakhorn Ratchasima is expected as the growth centre of Northeastern region (see Figure 3.1).

In 1999, Nakhorn Ratchasima had 39 hospitals, as well as some 350 health centres and around 237 doctors. As well, there is access to many levels of educational institutions, starting from pre-primary education to higher education.

According to a field survey by the BOI in the year 2000, the industries with high potential for investment in the province are as follows:

Processed agriculture industry – Nakhorn Ratchasima is an important source of agricultural products, including processed-rice and snack products, as well as livestock.

Frozen storage and packaging industry – With Nakhorn Ratchasima being one of the largest sources and markets in the region, frozen storage and packaging enterprises are a critical support to the processed agriculture industry, including livestock, fruit and vegetables.

Animal feed industry – Nakhorn Ratchasima is the primary producer of livestock corn, which is an important raw material for animal feed. At present, there is only one large manufacturer in the province. However, it is likely that the animal feed industry in the province could maintain expansion.

Electronic parts industry – There are several electronic parts businesses, such as Seagate, in the province. The presence of big manufacturing support is the attractiveness for this industry. In addition, there is an abundant supply of labour, public utilities and convenient transportation in the province.

Vehicle parts industry – Being the centre of transportation in the northeastern region, the province provides a good location with many lathe and auto body factories, as well as a large supply of specialty skilled labourers.

Surin, Lad Krabang King Mongkut University of Technology's campus in Buriram, Mahidol in Amnat Charoen, Suranaree University of Technology's campus in Udon Thani, and Mahasarakham University's campus in Nakhon Panom. Moreover, there are many branches of the National Institute of Development and Administration and Rajabhat Institute throughout the region.

Four public universities: Khon Kaen University, Ubon Rachathani University, Suranaree University of Technology and Mahasarakham University play a major role in manpower development in the region and a brief history of each is provided:

4.1 Khon Kaen University – KKU

Khon Kaen University is located in Khon Kaen, the centre of the region. KKU was established in 1964 as a regional university, as part of the Government's plan to expand higher education to the Northeast. In the beginning, the university emphasized engineering and agriculture studies. During the 1970s, courses were extended to education, nursing science and medicine.

In the 1980s, most of the current faculties were started so that Khon Kaen could offer a broad range of professional qualifications. In the 1990s the last two faculties were added, Management Sciences and Fine and Applied Arts, bringing the total number of faculties to 16. In addition, KKU has also built a new campus in Nongkhai, the bordering province with Lao PDR. That campus provides a Bachelor's degree programme in Business Administration and Economics.

At the end of the 1990s, two important buildings added to the community service aspect of the university's role: the Golden Jubilee Hall and the Art and Culture University Museum, both architecturally striking.

The faculties in Khon Kaen University can be broadly divided into three groups:

- 1) health science, medicine, dentistry, pharmaceutical sciences, associate medical sciences, public health and nursing, science and technology;
- 2) engineering, agriculture, sciences, technology, veterinary medicine, architecture and arts; and
- 3) humanities and social sciences, management sciences, education, fine and applied arts.

Since its establishment, KKU has produced 36,548 graduates as follows:

Engineering	7,850	Medicine	1,966
Agriculture	5,497	Dentistry	694
Sciences	3,228	Pharmaceutical sciences	941
Technology	962	Associate medical sciences	1,200
Veterinary medicine	398	Public health	1,100
Architecture	272	Nursing science	3,535
Humanities	2,565	Management sciences	957
Education	5,219		

Source: KKU

4.2 Ubon Ratchathani University – URU

Ubon Ratchathani University was founded in 1990 to serve the needs of higher education in eight provinces in the eastern part of the region: Nakhorn Panom, Mukdaharn, Yasothorn, Roi-et, Srisaket, Sakon Nakhorn, Amnatchareon and Ubon Ratchathani. The following is a chronology of its establishment:

1985: The Ministry of University Affairs proposes to establish Ubon Ratchathani College.

September 1987: Ubon Rachathani College is granted its official status by the Cabinet of Ministers.

29 July 1990: His Majesty the King graciously grants his Royal Consent to the Ubon Rachathani University ACT. The King issues a Royal Mandate appointing the first group of University Council Members. The University designates 30 July of each year as its Foundation Day.

25 January 1991: The King issues a Royal Mandate appointing Associate Professor Dr. Somchit Yodseranee as the Founding President of Ubon Ratchathani University.

December 1993: Her Royal Highness Princess Maha Chakri Sirindhorn presides over the first graduation ceremony on the university campus.

The goals of Ubon Ratchathani University are to improve the quality of life and expand the educational opportunities for the people in Northeast Thailand. The students will be developed to their full capacities and provided grounding in ethical standards. UBU provides higher education in agriculture, pharmaceutical sciences, sciences, engineering, humanities and social sciences and management sciences with four main goals:

- To produce qualified graduates who will contribute to the further development of Northeast Thailand.
- To support and improve research and apply contemporary knowledge and technology to improve industries and to improves the quality of life of the people in Northeast Thailand.
- To provide academic services to the public in order to distribute knowledge and enhance productivity and, thereby, increase the income of Northeast Thai people.
- To preserve the Northeast Thai culture.

The university personnel consists of 222 permanent academic staff, 66 academic assistants, 149 government employees, 99 permanent employees and 54 temporary employees. From 1997-2001, there were 2,330 graduates from UBU as follows:

Sciences	597
Engineering	915
Agriculture	387
Pharmaceutical sciences	160
Humanities & social sciences	98
Management sciences	173

Source: UBU

Ubon Ratchathani University also has cooperated academically with several educational institutes in the areas of mutual interests, joint research and exchange of visiting scholars, staff and students.

On 28 February 1998, UBU decided to extend its higher education services to Roi-et, the province located in the middle of the region. The campus provides courses in management sciences and conducts research as well as provides knowledge and innovation to both private and public sectors in the province.

4.3 Suranaree University of Technology – SUT

During the period of the Fifth National Economic and Social Development Plan, many projects were proposed to establish institutions of higher education affiliated with the Ministry of University Affairs as a response to the country's policy of higher education development. In 1984, the Ministry of University Affairs, by the power of the Ministry of University Affairs Board, issued an as is. It appointed a "Subcommittee to Consider the Feasibility of Establishing Institutions of Higher Education Affiliated with the Ministry of University Affairs".

This Subcommittee in turn set up four working groups to study the direction, suitability and feasibility of specific institutions. Later, the Subcommittee's name was changed to the "Subcommittee for Consideration of Suitability of Establishing New Universities" by order no. 42/1984, dated 12 April 1984 by the Ministry of University Affairs Board.

The Subcommittee studied and analyzed the suitability and then proposed the establishment of an institution of higher education in Ratchasima province to the Cabinet of Ministers. The Cabinet agreed in principle that there should be colleges affiliated with Khon Kaen University in Ubon Ratchathani and Nakhorn Ratchasima provinces, named Ubon Ratchathani and Suranaree Colleges, respectively.

The Cabinet, in its 21 August 1984 meeting, considered the matter and resolved that the Committee for Civil Service System and Administrative Regulations Reform deliberate and present a second proposal to the Cabinet. However, there was as yet no resolution with the consideration when the Government changed in August 1986. After establishment of the new Government in the same month, the Ministry of University Affairs resubmitted the project for establishing new universities as proposed to the Cabinet in 1984.

In the Cabinet of Ministers meeting on 21 April 1987, after some consideration, there was a resolution to wait for the opinions of the Committee for Civil Service System and Administrative Regulations Reform up to 30 September 1987. Meanwhile, Khon Kaen University was assigned to execute the Suranaree College Founding Project. While Khon Kaen was involved in that process, the Government, with Premier General Chatichai Choonhavan as Prime Minister, realized the importance and urgency of establishing universities in all regions.

On 13 September 1988, the Cabinet passed the resolution “Establishing New Universities in the Region” by approving the establishment of Suranaree College, affiliated with Khon Kaen University, at Nakhorn Ratchasima. Its status was elevated to independent university, as well. The Cabinet also appointed the “Suranaree University Establishment Committee” as is.

The Committee was to conduct studies and draft the Suranaree University Project. The Committee’s first session with the Permanent Secretary of the Ministry of University Affairs (then Prof. Dr. Wichit Srisa-an) on 30 September 1988 passed the following resolutions:

Khon Kaen University’s Suranaree College Establishment Project shall be transferred to the Office of the Permanent Secretary of the Ministry of University Affairs. The national forest area of the ‘Huay Yang Reservoir’ shall be requested from the Ministry of Agriculture and Cooperatives and be the site of Suranaree University. Monies under the 1989 fiscal year budget amounting to 8,195,600 baht shall be transferred from Khon Kaen University to the Suranaree University Establishment Project under the Office of the Permanent Secretary of the Ministry of University Affairs.

There shall be appointed the Suranaree University Establishment Project Drafting Subcommittee for that purpose as well as any other purpose designated by the Ministry of University Affairs Board.

In a meeting on 10-11 February 1989 of the Committee and Subcommittees, consisting of the Suranaree University Establishment Committee, the New Regional Universities Establishment Projects Coordination Subcommittee, the Suranaree University Establishment Project Drafting Subcommittee, the following principles were adopted:

- (1) The University shall be called Suranaree University of Technology to stress the special characteristics of the institution in response to national development needs and direction in higher education in the future.
- (2) The status and form of the institution is as a State university in enterprise form that will have a business administration without seeking profit and yet can respond to State policy, under the supervision of the Minister of University Affairs.
- (3) The personnel of the university shall be state employees, though not subject to labour law. The university's personnel administration shall be free from the civil service system.
- (4) Civil servants may join the university for a period of no less than 10 years after the establishment of the university and consider them fulfilling their civil service requirements. This allowed the university time to prepare its own personnel in sufficient numbers for its operations.

The Nakhorn Ratchasima Province University Establishment Committee proposed its project before the Cabinet as well as the draft of the bill to establish the University at Nakhorn Ratchasima province, with Suranaree University of Technology as its name. The Royal Thai Government, with Premier General Chatichai Choonhavan serving as Prime Minister, proposed the SUT Establishment Bill to Parliament in the 1989 session. His Majesty the King signed the Bill into effect on 27 July 1989. Suranaree University of Technology thus considers 27 July 1989 its Founding Day.

There were three phases in the planning of Suranaree University of Technology:

Phase 1 project drafting period (1988-1989). Since SUT was a new university, everything started from scratch; for example, a site had to be located, administrative and academic structures had to be developed, a master plan was created, a work force hired and the SUT Bill was drafted. There was also the process of establishing a “technology city” called Technopolis in conjunction with the Thai Agricultural and Industrial Exhibition, later changing to WORLDTECH’95 Thailand.

Phase 2 Pre-operative period (1990-1993). The next step was to prepare the university for admissions. Here construction, academics, administration, preparation of personnel and acquiring instruction equipment and materials were the main activities, as well as the continuation of Technopolis in conjunction with WORLDTECH'95 Thailand and seeking funds.

Phase 3 Operational period (1993-present). The first students were admitted in the 1993 academic year in nine programmes in the Engineering and Agricultural Technology programme clusters. Operations in this phase consisted of instruction according to the predetermined directive, consisting of theoretical, laboratory and practical instruction, both in laboratories and work sites.

Instructional Output

In 1993, SUT admitted its first 731 students in nine programmes in Engineering and Agricultural Technology courses.

In 1994, SUT admitted 966 students in 13 programmes in Engineering and Agricultural Technology as its second class.

In 1995, SUT admitted 1,394 students in 15 programmes in Engineering and Agricultural Technology as its third class. Also offered this year were two international undergraduate programmes in Mechanical and Electrical Engineering. SUT also organized WORLDTECH'95 Thailand in conjunction with the Royal Thai Government in the Technopolis area on the SUT campus between 4 November and 16 December 1995.

In 1996, SUT admitted 1,544 students in 17 programmes in Engineering and Agricultural Technology, its fourth undergraduate class. Two graduate programmes in Applied Mathematics and Remote Sensing were also offered. SUT also saw its first baccalaureates, 244 in number.

In 1997, SUT admitted 1,229 students in 18 programmes in Engineering, Agricultural Technology and Information Technology, its fifth undergraduate class. Six more graduate programs in Crop Production Technology, Animal Husbandry Technology, Biotechnology, Physics, Chemistry and Environmental

Biology began this year, with 41 graduate students admitted this year. The second baccalaureate class numbered 546.

In 1998, 1,256 students in 18 programmes in Engineering, Agricultural Technology and Information Technology were admitted, the sixth undergraduate class. SUT also admitted 114 students in 19 graduate programmes. SUT's third baccalaureate class numbered 747.

In 1999, SUT admitted its seventh undergraduate class consisting of 1,234 students in 20 programmes in Engineering, Agricultural Technology, Information Technology and Public Health. SUT also admitted 111 students in 34 graduate programs. SUT's fourth baccalaureate class numbered 936, as well as 14 Master's and Doctoral program graduates in science and agricultural technology.

In 2000, SUT admitted its eighth undergraduate class consisting of 1,230 students in 20 programmes in engineering, agricultural technology, information technology and public health. SUT also admitted 135 students in 37 graduate programmes. SUT's fifth baccalaureate class numbered 1,019, as well as 21 Master's and Doctoral programme graduates in science and agricultural technology.

4.4 Mahasaraskham University – MSU

Maharakham University originated from Maharakham College of Education, which was established in 1968. In 1974, the status of the college was elevated to become a branch campus of Srinakharinwirot University, the administrative centre of which was then in Bangkok. On 7 December 1994, His Majesty the King graciously signed and approved the Maharakham University Act, which was published in series III, Section 54 A of the Royal Gazette. As a result, Srinakharinwirot University, Maharakham, became an independent university named Maharakham University, as of 9 December 1994. Currently, the university operates eight faculties, three supporting academic centres and two research institutes.

Eight faculties of MSU offer courses in humanities and social sciences, sciences, education, technology, nursing science, pharmaceutical science and public health, accounting and management science, engineering and computer sciences, architecture and arts.

MSU currently enrolls approximately 12,400 students studying in one certificate-level programme, 45 undergraduate programmes and 20 post-graduate degree programmes. More than 1,000 faculty and staff members are currently employed at the university. In 1999, MSU established its new campus in Nakhorn Phanom province. The campus offers higher education in two fields: Sciences and Technology and health sciences. Sciences and Technology studies are divided into six faculties: sciences, agriculture, IT, architecture, computer sciences and engineering. The health science studies consist of public health, nursing sciences and pharmaceutical sciences.

As a higher educational institution, Maharakham University is determined to achieve its goal of academic excellence, integrating both local intellect and universal knowledge. MSU views that when it succeeds in doing so, a growth in intelligence to develop individuals to fulfil academic skills, good behaviour and virtue will be initiated. MSU focuses upon taking a leading role in directing and in adhering to the society's virtuous ideals for the advancement of the country as a whole. The university's personnel are, therefore, expected to actively take part in constructing a real academic atmosphere.

Throughout its history, Maharakham University has been concerned with the total development of the individual. The university aims to increase students' abilities to earn a living and be self-reliant in modern society by developing effective communication skills. Also, the university is concerned with developing students' appreciation of Thai culture and the Thai way of life, including the importance of achieving balance and rapport between the old and the new, as well as the importance of developing and maintaining harmonious relations with various sectors, both urban and rural, of the Thai communities. As an independent institution, Maharakham University plans to expand its programmes to better prepare Thai students to serve current needs of their rapidly developing nation.

5. THE POSSIBILITY OF BUILDING INFORMATION NETWORKS AND THE LINKAGES WITH ADMINISTRATION, EDUCATION AND PRIVATE SECTOR

The overall information network management in the Northeast is confusing. The education, administration and private sectors have each developed networks separately with different objectives. The education sector seems to have a clear purpose and receive full support from the Government. The main educational information network in the Northeast includes the university network and the school network. As of February 2003, there were four university networks: KKU, UBU, MSU and SUT. Each network is the responsibility of the campus Computer Centre, as explained in the following:

KKU Computer Centre

KKU Computer Centre provides computer services for study, research and training. It is the centre for the university's computer network; the changes taking place in information technology mean that the Computer Centre is continuously developing. The Computer Centre offers the following main services: Internet access from inside KKU or via modem from outside, training and support to the computer system. To become a user, undergraduates pay a fee of 300 baht per year and graduates pay 500 baht per year.

UBU Computer Centre

UBU has its own computer network – Kan-Krao Net – for internal usage and links to the external network both domestically and internationally. In the long term, the university intends to develop its network to be the information centre of the eastern Northeast, serving the area and neighbouring counties. The internal network is transmitted via fibre optic line and links to all buildings with the star topology. The first access to the Internet of UBU was in 1997. In the first stage, UBU used the private ISP ANET Ubon, which was later changed to UNINET in 1999 with a speed of 128 Kbps.

The MSU Computer Centre

The MSU Computer Centre was established in 1995. The Computer Centre offers services to support instruction, research and administration. It also functions to assist the university in training faculty members and students in utilizing computer programs for their academic progress. Students and staff of MSU are welcome to use services and facilities provided by the Centre. In addition, the Centre serves the regional community by organizing seminars and short-term training programmes for personnel from various offices.

MSU has its own network named Sarakham NET, which is linked to the UNINET. With this linkage, MSU is able to access various services from UNINET, such as video conferencing systems (VCS), education on demand system and electronic library. Sarakham NET was connected to UNINET with the speed of 2 Mbps, and a speed for the Internet at 1,024 Kbps. The remaining for VCS while the connection from the old campus to the new campus was allocated with the speed 2,048 Kbps. Members can access to net Sarakham in two ways: connect through a private ISP-A-NET with a speed 384 Kbps or directly connect with the speeds mentioned above.

MSU Academic Resource Centre

The Academic Resource Centre (ARC) is an instructional materials centre, serving the study and research needs of the students, faculty and staff of all faculties of the university, and, through them, the broader northeastern community. The Centre contains approximately 150,000 Thai-language and 50,000 English-language volumes and subscribes to more than 1,700 periodicals, including 42 newspapers. The Centre has more than 14 OPAC terminals offering access to all materials housed in the campus library. Any users with a valid ID may listen to or view items in the viewing room of the audiovisual section, which is equipped with CD, cassette, VDO tape, slide, filmstrip, etc. ARC participates in inter-library loan programmes with other libraries throughout the country. The Centre has been computerized; therefore, access to domestic and international information services can be gained through the PULINET and the Internet.

Of special note is the Centre's Sirindhorn Information Science Centre – a repository of approximately 50,000 volumes, journals, videos and other forms of information related to the northeastern region of Thailand. Her Royal Highness Princess Maha Chakri Sirindhorn graciously bestowed the name of this centre.

In addition, another educational information network in the Northeast is the SchoolNet. As of January 2003, there were 278 schools in every province in the Northeast participating in the project and had already established their own Web site.

In the private sector, there are 21 private ISPs in the Northeast, which includes four brand names: Loxinfo, A-Net, KSC and Internet Thailand. Loxinfo has opened four branches and provides service in Khon Kaen, Nakhorn Ratchasima, Udon Thani and Ubon Ratchathani. A-NET has launched seven branches in the region and offers service in Nakhorn Ratchasima, Udon Thani, Surin, Mukdaharn, Roi-et, Srisaket and Yasothorn. KSC is doing its business in seven provinces: Khon Kaen, Nakhorn Ratchasima, Udon Thani, Mahasarakham, Burirum Nongkhai and Sakon Nakhorn while Internet Thailand provides service in Khon Kaen, Nongbualampu and Chaiyapum.

Table 5.1: Number of Private ISPs, SchoolNet and UniversityNet in Northeast Thailand by Province

Province	No. of ISP	Loxinfo	A-NET	KSC	Internet Thailand	No. of SchoolNet	No. of University Net
Nakhorn Ratchasima	3				-	27	1
Khon Kaen	3		-			32	1
Udon Thani	2		-		-	13	-
Ubon Ratchathani	2			-	-	27	1
Nongbualampu	1	-	-	-		2	-
Surin	1	-		-	-	12	-
Maharakham	1	-	-		-	19	1
Burirum	1	-	-		-	8	-
Nongkhai	1	-	-		-	16	-
Mukdahan	1	-		-	-	6	-
Roi-et	1	-		-	-	18	-
Sisaket	1	-		-	-	13	-
Yasothon	1	-		-	-	5	-
Sakon Nakhorn	1	-	-		-	11	-
Chaiyapum	1	-	-	-		27	-
Nakhorn Phanom	-	-	-	-	-	12	-
Amnat Charearn	-	-	-	-	-	9	-
Kalasin	-	-	-	-	-	11	-
Loi	-	-	-	-	-	10	-
Total	21	4	7	7	3	278	4

Source: NECTEC

Technically, it's possible to link the education, private and government (GInet) networks together. However, in terms of management, the concerned organizations, such as NECTEC, Communication Agencies and educational institutions, should review and design the appropriate model that can provide the maximum benefit to all stakeholders.

6. CONCLUDING REMARKS

The Northeast is clearly characterized by the “digital divide”, reflecting the lowest number of PCs at home per household and the lowest number of with access households to the Internet as compared with other regions. This digital divide presents the greatest challenge for policymakers, strategists and planners who are responsible for ICT development as well as national development as a whole, and who hope that the IT network will be used as a tool to build up the knowledge-based society within the region.

In the view of the economic situation and labour market, the existing situation of the Northeast is not favourable for ICT development. In 2000, gross regional product contributed 8.9 percent to the country’s while one third of the people in the country live in the region. Thus the Northeast, in terms of per capita income, ranked the lowest and recorded only 12.5 percent of per capita income of the people in Bangkok Metropolitan area.

The impact of the financial crisis in the region wasn’t much different from that experienced in the other regions. Fortunately with its agricultural base, the region played a major role as a shock absorber or a safety net for the people returning home when they were laid off from jobs in Bangkok.

In addition to the labour force, the Northeast is the leading labour export region of the country, both domestically and internationally. The reason is that, again, one third of the country’s population lives in this region and remains poor while jobs are not available for them. Thus, seasonal migration of labour to Bangkok and to work abroad still occurs. Unfortunately, the majority of the over-15 population is low educated and unskilled. This may be advantageous in terms of quantity and low cost of business but disadvantageous in terms of quality of life and earnings of people – most of whom are paid low wages.

Industrial development in the Northeast, measured by the GRP industrial sector, showed an improvement and significant structural changes. However, the agri-industry, which is dependent heavily on agricultural raw material, has been the major enterprise. Development in the manufacturing industry has been clearly seen in the major cities of the region: Nakhorn Ratchasima, Khon Kaen, Udon Thani and Ubon Ratchathani, mainly

was a labour intensive and a subcontracting firm. As a result of investment promotion, foreign direct investment has been significantly clustered in the bigger cities due to the availability of infrastructure, such as transportation, water supply, electricity, industrial estates, etc.

Public universities play a major role in higher education in the region. Graduates are mainly in social science fields. Computer science, computer engineering and IT graduates are few. Knowledge and skills enhancement in English, computer literacy and IT are needed for non-science students. Being the ISP and the information centre of the Northeast is another role of the regional universities. Information linkages and networks between regional universities, Government and private agencies should be promoted. In addition, intensive training programmes, especially in how to utilize ICT for life long learning and improvements in the standard of living should be rushed for implementation as well.

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