

4. URBAN AND HUMAN SETTLEMENT DEVELOPMENT

4.1 Key Issues for Urban and Human Settlement Development in the Upper Central Region

Urban centers are to be strengthened for two economic reasons in general: one is to support the agricultural and industrial activities, and the other is to increase job opportunities in the service sector. Through strengthening of service sector's activities, the regional economy may become more resilient, stable and capable of inviting more economic activities, thereby providing a favorable cycle for regional growth. Thus, the strengthening of urban service functions is a key to induce an additional regional economic growth.

To achieve the regional development targets for the UCR delineated in our study, the urban sector has to address itself to the following specific objectives:

- a. To encourage and expand the urban service activities so as for the UCR to be more independent of the Bangkok Metropolitan Economy, and provide job-opportunities in the service sectors.
- b. To encourage the urban functions to support the agricultural diversification and industrial base development as :
 - business incubators'
 - suppliers of capitals and human resources
 - connectors of producers and consumers
 - presenters of a wide variety of urban services for the hinterland

activities.

- c. To create urban amenities sufficiently enough to induce additional investment and personnel.

In view of the above objectives, the UCR has been confronted with the following issues to be tackled:

4.1.1 Strengthening of the Service Sector Economy in the Upper Central Region

Weakness of the service sector economy will be a critical constraint for the UCR development. According to the 1987 GRP data, per capita service sector output at 1987 prices is about 9,700 baht in the UCR, compared with 62,710 baht in the BMR and 13,030 baht in the whole nation. The relative size of service sector in the UCR economy is only 15% of that in the BMR, and three quarters of that in the nation, as shown in Fig. 4.1. The UCR is considerably dependent upon the Bangkok economy due to its proximity, and has not developed its own service sector. The ultimate result is the immaturity of urban activities within the UCR. Strengthening of the service sector economy is a substantial issue for UCR development.

4.1.2 Stimulation of Existing Potentials and Functions

The existing accumulation of urban economies should be more stimulated, because it must be a seed for further growth. Table 4.1 shows the per capita output (GRP) by sector, which implies the relative degree of sectoral predominance. The sectors that are relatively predominant in the UCR compared to the national average (or the sectors with more than 1.0 of location quotient in Table 4.2) are "mining and quarrying", "public administration and defence", and "electricity & water supply". On the other hand, relatively weak sectors are "manufacturing", and "banking & financing".

In the same manner, a comparison of the per capita output by sector in the UCR can be seen in Table 4.2. The sectors of relative predominance

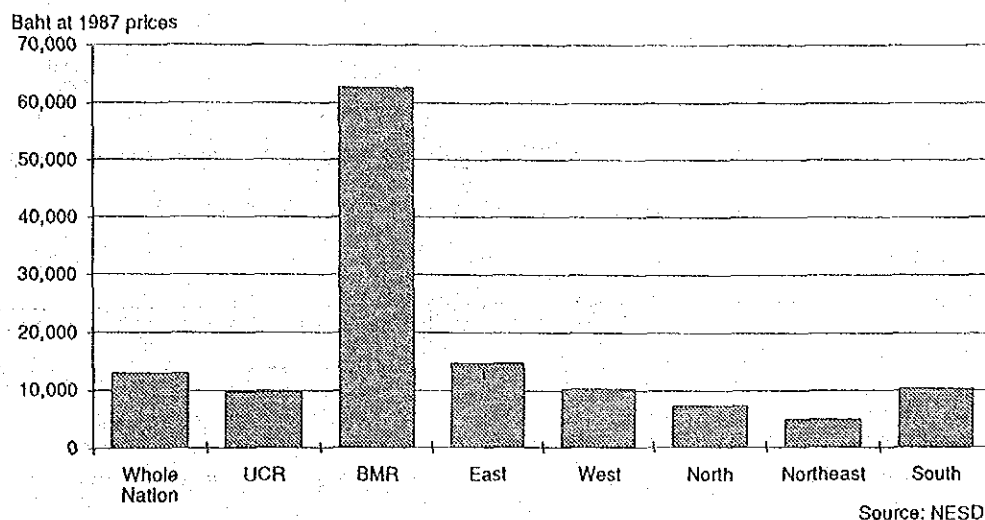


Fig. 4.1 Regional Comparison of Per Capita Output in Service Sector

Table 4.1 Comparison of Per Capita GRP by Sector in 1986

1) Baht at 1986 Prices

	NATIONAL (1)	National (2) Excl. BMR	UCR	BMR
AGRICULTURE	3,456	3,830	3,329	1,361
MINING AND QUARRYING	441	486	1,112	188
MANUFACTURING	4,277	1,370	1,712	20,547
CONSTRUCTION	1,051	735	799	2,820
ELEC. & WATER SUPPLY	532	263	574	2,039
TRANSPORT AND COMM.	1,922	1,076	1,489	6,656
WHOLESALE, RETIAL TRADE	3,853	2,812	3,752	9,679
BANKING, INSURANCE	1,647	643	881	7,268
OWERING OF DWELLINGS	281	215	297	656
PUBLIC ADMI. AND DEFENCE	928	749	1,169	1,926
SERVICES	2,347	1,242	1,360	8,532
Total	20,736	13,420	16,473	61,672

2) Location Quotient to the National Average

	NATIONAL (1)	National (2) Excl. BMR	UCR	BMR
AGRICULTURE	1.0	1.1	1.0	0.4
MINING AND QUARRYING	1.0	1.1	2.5	0.4
MANUFACTURING	1.0	0.3	0.4	4.8
CONSTRUCTION	1.0	0.7	0.8	2.7
ELEC. & WATER SUPPLY	1.0	0.5	1.1	3.8
TRANSPORT AND COMM.	1.0	0.6	0.8	3.5
WHOLESALE, RETIAL TRADE	1.0	0.7	1.0	2.5
BANKING, INSURANCE	1.0	0.4	0.5	4.4
OWERING OF DWELLINGS	1.0	0.8	1.1	2.3
PUBLIC ADMI. AND DEFENCE	1.0	0.8	1.3	2.1
SERVICES	1.0	0.5	0.6	3.6
Total	1.0	0.6	0.8	3.0

Source: NESDB

Table 4.2 Comparison of Per Capita GRP by Sector in the UCR In 1986

1) Baht at 1986 Prices

	UCR	Sara Buri	Lop Buri	Sing Buri	Chai Nat	Ang Thong	Ayutthaya
AGRICULTURE	3,329	3,738	3,260	3,359	4,779	3,208	2,986
MINING AND QUARRYING	1,112	5,084	119	118	30	696	198
MANUFACTURING	1,712	5,010	456	1,557	639	305	1,720
CONSTRUCTION	799	834	960	566	1,560	477	416
ELEC. & WATER SUPPLY	574	1,541	331	288	141	345	508
TRANSPORT AND COMM.	1,489	1,183	1,415	2,188	1,038	2,495	1,395
WHOLESALE, RETIAL TRADE	3,752	3,815	3,622	3,996	3,566	4,199	3,676
BANKING, INSURANCE	881	966	760	1,246	793	936	850
OWERING OF DWELLINGS	297	295	296	318	306	306	283
PUBLIC ADMI. AND DEFENCE	1,169	1,087	1,723	962	1,355	812	754
SERVICES	1,360	1,490	1,082	2,026	1,664	1,269	1,223
Total	16,473	25,042	14,024	16,624	15,870	15,048	13,408

2) Location Quotient to the UCR Average

	UCR	Sara Buri	Lop Buri	Sing Buri	Chai Nat	Ang Thong	Ayutthaya
AGRICULTURE	1.0	1.1	1.0	1.0	1.4	1.0	0.7
MINING AND QUARRYING	1.0	4.6	0.1	0.1	0.0	0.6	0.2
MANUFACTURING	1.0	2.9	0.3	0.9	0.4	0.2	1.0
CONSTRUCTION	1.0	1.0	1.2	0.7	2.0	0.6	0.5
ELEC. & WATER SUPPLY	1.0	2.7	0.6	0.5	0.2	0.6	0.9
TRANSPORT AND COMM.	1.0	0.8	0.9	1.5	0.7	1.7	0.9
WHOLESALE, RETIAL TRADE	1.0	1.0	1.0	1.1	1.0	1.1	1.0
BANKING, INSURANCE	1.0	1.1	0.9	1.4	0.9	1.1	1.0
OWERING OF DWELLINGS	1.0	1.0	1.0	1.1	1.0	1.0	1.0
PUBLIC ADMI. AND DEFENCE	1.0	0.9	1.5	0.8	1.2	0.7	0.6
SERVICES	1.0	1.1	0.8	1.5	1.2	0.9	0.9
Total	1.0	1.5	0.9	1.0	1.0	0.9	0.8

Source : NESDB

are:

- Mining and quarrying sector in Sara Buri;
- Manufacturing sector in Sara Buri;
- Construction sector in Chai Nat and Lop Buri;
- Electricity and water sector in Sara Buri;
- Transport and communication sector in Ang Thong and Sing Buri;
- Wholesale and retail sector in Sing Buri and Ang Thong;
- Banking and insurance sector in Sing Buri; and
- Public administration sector in Lop Buri and Chai Nat.

These features imply the economic base of urban development in each center. Development policies may place emphasis basically on facilitating these relatively predominant economic functions.

4.1.3 Creation of Business Investment Opportunities

Looking at the regional money flow in terms of the deposit-to-credit ratio (D/C Ratio), the D/C Ratios in the UCR were always more than the unity (1.0) as shown in Table 4.3 and Fig. 4.2. In the nation as a whole, the D/C Ratios have been over the unity since 1981 along with the economic growth. From the macro-economic point of view, this proves a fact that the savings in Thailand have boosted the Thai economy. However, in the regional context, this table implies another structure of regional money flows.

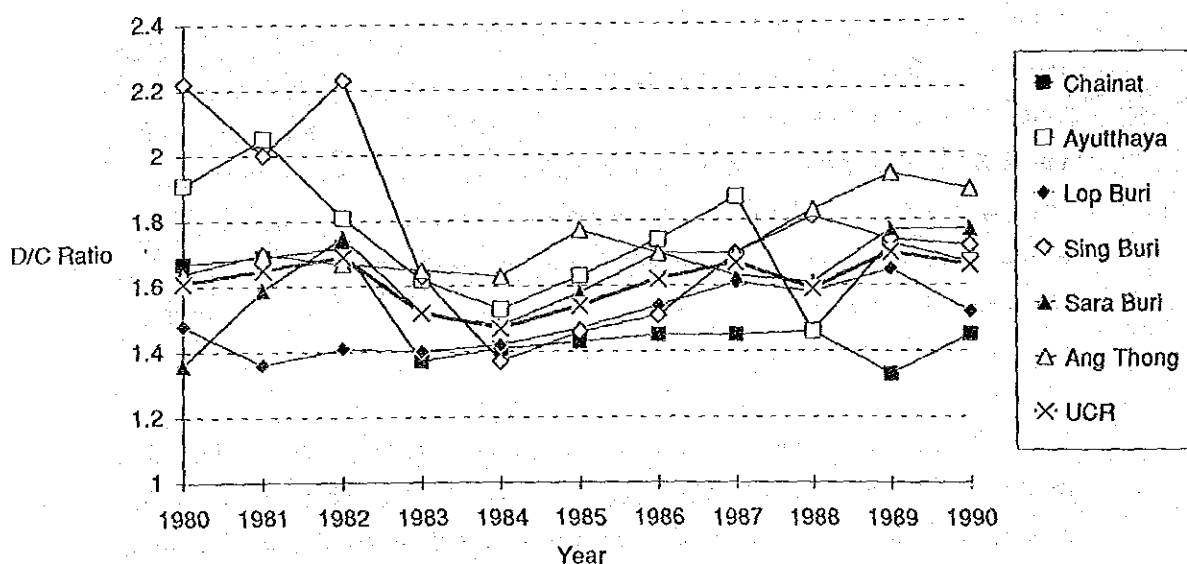
The D/C Ratios in the UCR were always significantly larger than those in the BMR and even the other regions. This means that the UCR are always a saving area, and money is not invested in the UCR. In other words, the money deposited in the UCR is floating out and utilized in the BMR rather than in the UCR. A conceivable reason would be that there are less business investment opportunities in the UCR. Looking into the differences among Changwat in D/C Ratio, as shown in Table 4.4, Ang Thong, Sara Buri, and Sing Buri have larger ratios than the average of the UCR.

**Table 4.3 Regional Money Flow
(Regional Comparison in Deposit-to-Credit Ratios)**

	W. Kingdom	BMR	Central	North	Northeast	South
1980	0.98	0.83	1.46	1.39	1.69	1.46
1981	1.01	0.87	1.52	1.34	1.45	1.47
1982	1.07	0.93	1.61	1.39	1.36	1.43
1983	1.01	0.90	1.39	1.23	1.13	1.32
1984	1.04	0.96	1.35	1.18	1.13	1.32
1985	1.06	0.96	1.46	1.17	1.21	1.42
1986	1.15	1.05	1.58	1.30	1.31	1.51
1987	1.11	1.01	1.60	1.34	1.30	1.46

Source: Bank of Thailand

Notes: All banking institutions are included.



Source: Bank of Thailand

Notes: All banking institutions are included.

Fig. 4.2 Comparison in Deposit-to-Credit Ratios in the UCR

Table 4.4 Deposit and Credit in the UCR

(Unit : Million Baht)

	Total Deposit	Total Credit	D/C Ratio
1) Monthly as of December 1981			
Chai Nat	695.2	412.4	1.69
Ayutthaya	1,691.7	825.4	2.05
Lop Buri	2,082.9	1,532.1	1.36
Sing Buri	943.9	472.3	2.00
Sara Buri	1,795.2	1,131.3	1.59
Ang Thong	674.1	396.3	1.70
UCR	7,883.0	4,769.7	1.65
2) Monthly as of December 1985			
Chai Nat	1,421.6	993.5	1.43
Ayutthaya	3,682.3	2,262.5	1.63
Lop Buri	3,894.2	2,651.2	1.47
Sing Buri	1,891.6	1,294.4	1.46
Sara Buri	3,731.4	2,361.6	1.58
Ang Thong	1,453.2	841.7	1.77
UCR	16,074.3	10,405.0	1.54
3) Monthly as of December 1988			
Chai Nat	1,996.6	1,363.3	1.46
Ayutthaya	5,786.2	3,958.4	1.46
Lop Buri	5,102.4	3,235.4	1.58
Sing Buri	2,866.0	1,581.8	1.81
Sara Buri	5,400.7	3,352.5	1.61
Ang Thong	2,039.8	1,113.2	1.83
UCR	23,191.6	14,604.6	1.59
4) Monthly as of January 1990			
Chainat	2,494.1	1,725.1	1.45
Ayutthaya	8,358.5	4,996.3	1.67
Lop Buri	6,212.4	4,089.7	1.52
Sing Buri	3,336.5	1,935.5	1.72
Sara Buri	8,003.7	4,527.4	1.77
Ang Thong	2,635.4	1,396.8	1.89
UCR	31,040.5	18,670.8	1.66

Source : Bank of Thailand

Creation of business opportunities is needed. In the regional context, amount of the regional credits, which would bear larger deposits in turn, may be crucial to initiate the regional economic growth.

4.1.4 Provision of Supporting Functions for Agriculture

Since the UCR is based inherently on agriculture, the urban sector's primary function is to make the market distribution of agricultural products more efficient by strengthening the potential marketing centers such as Sara Buri, Ang Thong, Sing Buri and other marketing sub-centers. At the same time, agricultural inputs including capital, information, machinery, and parts should be supplied through the urban economies.

4.1.5 Provision of Job Opportunities

Looking into the farmers' household income in the UCR, the average net income per family amounted to 29,168 baht at 1986 prices, of which 17,578 baht, or 60%, came from non-farming sources. This implies that farmers' demand for the employment outside agriculture may be quite strong. In addition, the demand for work to compensate the seasonal unemployment in the agricultural sector should be taken into account in regional cities. If regional cities in the UCR are not able to accommodate this demand, the migration to Bangkok would continue unabated.

We predict that the number of jobs in the service sector will be about 929 thousand, compared with 578 thousand at present. Thus, about 351 thousand jobs should additionally be created in the service sector, most of which will be provided in the urban areas.

4.1.6 Activation of Inter-regional Economic Transactions

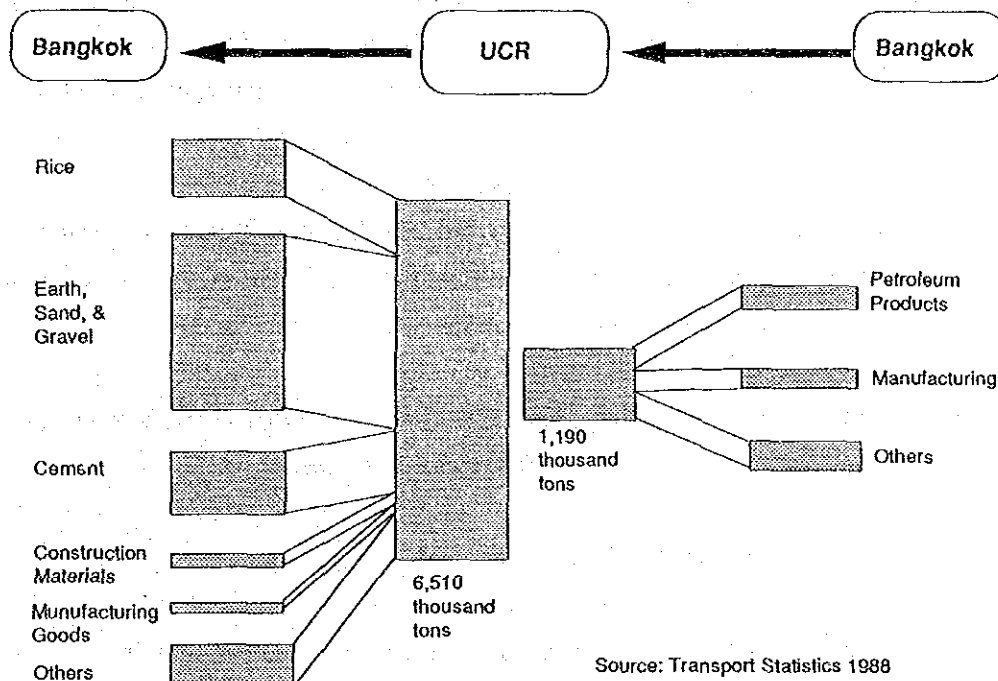
Although the UCR locates at the gateway to the Bangkok as well as the the northern and the northeastern regions, as far as the goods transport flows are concerned, the UCR's inter-regional economic transactions have not been activated yet, but has functioned as merely a

Table 4.5 Goods Transport: the UCR to/from the Bangkok In 1988

	UCR to BKK		BKK to UCR		(Unit: thousand tons)		
	(Out-Bound)	(%)	(In-Bound)	(%)	Balance	(%)	1)
Rice	1,017.7	15.6	8.6	0.7	1,009.1	19.0	S
Maize	146.6	2.3	0.3	0.0	146.3	2.7	S
Tapioca	47.7	0.7	0.5	0.0	47.2	0.9	S
Suger	16.4	0.3	0.5	0.0	15.9	0.3	S
Other Agro-products	61.6	0.9	22.2	1.9	39.4	0.7	S
Rubber	0.2	0.0	0.0	0.0	0.2	0.0	S
Farm Products	25.8	0.4	12.5	1.1	13.3	0.2	S
Forest products	49.7	0.8	38.0	3.2	11.7	0.2	S
Petroleum Products	2.4	0.0	351.3	29.6	-348.9	-6.6	*
Earth, Sand & Gravel	3,315.3	50.9	6.2	0.5	3,309.1	62.2	S
Minerals	5.2	0.1	6.8	0.6	-1.6	0.0	*
Cement	1,217.9	18.7	1.6	0.1	1,216.3	22.9	S
Construction Materials	251.9	3.9	50.1	4.2	201.8	3.8	S
Fertilizer	8.1	0.1	95.1	8.0	-87.0	-1.6	*
Manufacturing Goods	205.2	3.2	305.6	25.7	-100.4	-1.9	*
Others	62.2	1.0	223.1	18.8	-160.9	-3.0	*
Unknown	75.3	1.2	65.6	5.5	9.7	0.2	S
Total	6,509.2	100.0	1,188.3	100.0	5,320.9	100.0	S

Source: Transport Statistics, 1988

Notes : " S " stands for the commodity that the UCR is over-supplier to Bangkok,



Source: Transport Statistics 1988

Fig. 4.3 Transport Pattern (1988) between the UCR and Bangkok

mineral material supplier.

Table 4.5 and Fig. 4.3 show the present pattern of goods transport to/from Bangkok by commodity, according to the 1988 Transport Statistics. The total volume of goods transported from the UCR to Bangkok is about 6.5 million tons, while that from Bangkok to the UCR is 1.2 million tons. Thus, the UCR holds a large imbalance (over-supply) of 5.3 million tons. Major commodity transported from the UCR to Bangkok is "earth, sand & gravel" (50.9% of the total), followed by "cement" (18.7%) and "rice" (15.6%). The share of these three commodities is more than 85%. On the other hand, major commodities transported from Bangkok to the UCR were "petroleum products" (29.6% of the total) and "manufacturing goods" (25.7%). Thus the UCR is a supplier of limited mineral-related materials. More diversified economic interactions with Bangkok need to be promoted through regional economic diversification.

4.1.7 Development of Urban Infrastructure

One of the most crucial urban problems is flood in the cities located alongside the Chao Phraya River; Ang Thong, Sing Buri, Chai Nat and some sanitary districts. Serious economic damages occasionally happen to these centers. Development of the drainage systems and banks necessary to protect these cities from those flood damages should be undertaken with the first priority.

Basic utilities such as waste water and solid waste treatment systems are also important from the environmental point of view; the water quality of all the rivers should not be worsen anymore.

In a number of centers, need is identified to improve or develop public transport terminals and transportation systems.

4.1.8 Provision of Social Infrastructures

Cities must provide social services to meet the socioeconomic requirements: commercial, social, medical, educational, and

recreational services. For these services, necessary public facilities and amenities must be developed to assure a "social infrastructure", which is a basic need not only to attract industries and related business, but also to create a human resource development base. The development of all the Changwat centers, at least, need to highlight this aspect, and higher potential centers such as Ayutthaya, Sara Buri and Lop Buri should be provided with social service at higher standard.

4.2 Urban Development Concepts and Policies

The principles of urban development in the UCR are threefold: (1) the urban activities should be strengthened as a whole; (2) the existing growth potential of urban economies should be reinforced; (3) lower order centers, which are endowed with strategic advantages or will be capable of playing specific roles in serving their hinterland activities, should be strengthened with provision of necessary urban infrastructure.

4.2.1 Potential Regional Urban Centers Development

Stimulation of potential urban cores are necessary for promoting the regional development as a whole. Urban centers with two specific functions are developed with the following purposes:

- a. Industrial supporting function with the purpose of:
 - Accommodation of industrial investments from outside
 - Strengthening of local industries
 - Creating urban services employment
 - Tourism development

- b. New regional core function with the purpose of:
 - Encouragement of urban functions to be relocated from the BMR
 - Promotion of R & D and new technologies
 - Human resource development

Regarding the magnitude of urban centers, only Ayutthaya and Sara Buri Cities are noted: Ayutthaya City has a population of 63 thousand and the area under its direct influence (Amphoe) has 118 thousand population. Sara Buri City has 57 thousand population and the area under its direct influence has 119 thousand population. Population growth rate in both cities are recently over 3.0% per annum. Industrial supporting services as well as commercial and marketing functions have been accumulated to a considerable extent in these cities.

Another notable center is Lop Buri City, although it has only 37 thousand city population and its growth rate is negative; - 0.1%. Though the city has not so been densely populated, urbanization is stretching out over vicinities of the city. The area under its direct influence (Amphoe) holds 246 thousand population.

The development policies of the three potential cities are based on these characteristics and endowments. Sara Buri is encouraged to function as a strategic regional center to support all hinterland economies of agriculture and industry. Ayutthaya is encouraged to function as a sub-regional service center for both traditional and modern industrial activities in the surrounding areas, and a tourism center in the UCR. Lop Buri, as another major sub-regional center, is developed based on its administrative, educational and tourism functions.

1) A New Industrial Core Development in Greater Sara Buri Area

Integrating all the near-by districts which have large potential to attract various industries, "Greater Sara Buri Industrial Core (GSIC)" is recommended to be structured as a focal area in the industrialization program. The GSIC will consist of four sub-cores as shown in Fig. 4.4, namely, Kaeng Khoi, Sara Buri, Tha Rua -Tha Luang, and Nong Khae sub-cores. These are to function as follows:

Kaeng Khoi Sub-core: The existing large scale cement industry and its related industries are seeds for further industrial

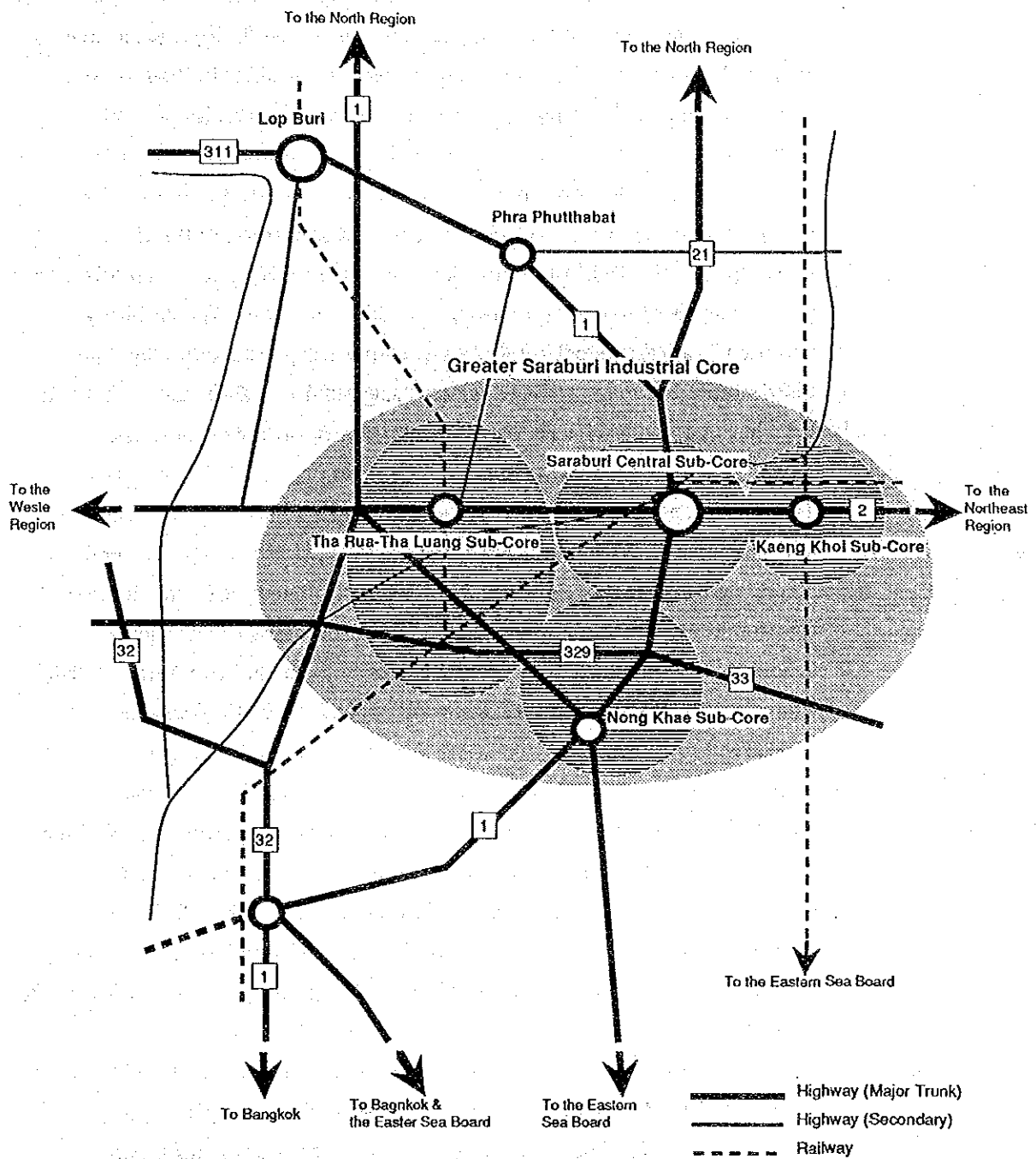


Fig. 4.4 Conceptual Structure of Greater Sara Buri Industrial Core (GSIC)

development in this core. Mineral resources-based industries including ceramics and other technology-intensive industries are to be promoted. Inter-modal transport facilities such as container yard and inland depot associated with highways and a new rail link with the ESB may show up in this industrial sub-core. Kaeng Khoi City will be the industrial service center.

Sara Buri Central Sub-core: Industries supported largely by urban functions such as goods and information collecting, marketing, distributing, and human resources and technologies generating are to be promoted in this Sub-core. Technology-oriented, agro-processing, urban supporting, assembling and distribution services industries are acceptable. Sara Buri City is the service center with sufficient metropolitan functions.

Tha Rua-Tha Luang Sub-core: The existing large scale cement and steel mill industries and distribution facilities (silos and warehouse) of maize, tapioca and rice are seeds of the industrial development in this sub-core. Agro-processing and agro-products and steel derivative industries are to be promoted. Tha Rua City and Tha Luang Town will function as the service centers.

Nong Khae Sub-core: This area with an intersection of National Highway Routes No.1 and No.33 is assessed to be one of the potential areas for industrial development because of its advantageous location in road transport. A number of ceramic industries and small- and medium-scale garment industries locate in this area.

As the GSIC development is one of the main strategies recommended, further discussion on the GSIC development is made in Section 5.1 in this report.

2) Regional Urban and Tourism Center Development in Ayutthaya

The Ayutthaya City is a significant regional center to serve the industrialization taking place in the surrounding areas, and at the same time, it is endowed with a large potential of tourism development based on the invaluable historical assets.

Combining these two characteristics, the Ayutthaya City should be developed. However, special attention should be paid to excessive urbanization.

In line with this concept, two master plans have been made: "Tourism Development Master Plan of Ayutthaya and Nearby Provinces" prepared by Tourism Authority of Thailand (TAT) (1988), and "Conservation and Development Project of Ayutthaya Historical City" prepared by Department of Fine Arts (1989). The two master plans have depicted an appropriate picture of Ayutthaya, and proposed a number of programs/projects to make the city more attractive and functional. These may be guidelines for the future city development.

Associated with the increase in industrial locations in surrounding areas, a rapid increase in illegal settlers mainly of factory workers and vendors have become a social as well as urban problems in Ayutthaya City. Because of the limited available land in the municipal area (a large portion of the land is owned by the public), these squatters are likely to occupy the public land. Since urban population will increase continually (the urban population in the Ayutthaya municipality is projected to double in 2010), this sort of problem will get more serious. Therefore, a proper management of the land use is urgent not only in the municipal area but in an area equivalent to Ayutthaya Metropolitan Area inclusive of its relevant vicinities.

3) Specific Urban Functions Development in Lop Buri

Lop Buri City has a potential to become a regional center with a wide variety of cultural and higher educational functions. These

functions with a higher service level for not only the Changwat Lop Buri but also the UCR should be encouraged to stimulate the urban economy in this city. The research and development institutions for new applied agricultural technologies are recommended to be promoted as well. Tourism is also a seed to develop this city.

4.2.2 Sub-Regional Centers Development

1) Meeting Basic Urban Needs in Sub-Regional Centers

Ang Thong, Sing Buri, and Cha Nat are the provincial centers and have important roles to serve the hinterland agricultural activities in the Chao Phraya Delta. Their commercial and marketing functions have historically been accumulated, and need to be further emphasized in the future as well.

Other than provincial centers, there are two important centers which have comparatively great potentials as sub-regional centers: Phra Phutthabat and Lam Na Rai. Both centers will be service centers for upland agricultural activities. Phra Phutthabat is endowed with domestic tourism resources as well. Lam Na Rai, although it is a sanitary district at present, will be the fourth largest urban center to serve upland agriculture to be encouraged by the Pasak River Basin Development.

All the centers have to facilitate basic urban infrastructures such as water supply, drainage, solid waste treatment, waste water treatment, electricity supply, telecommunication, public transport systems, and road access to the hinterland at certain standard levels.

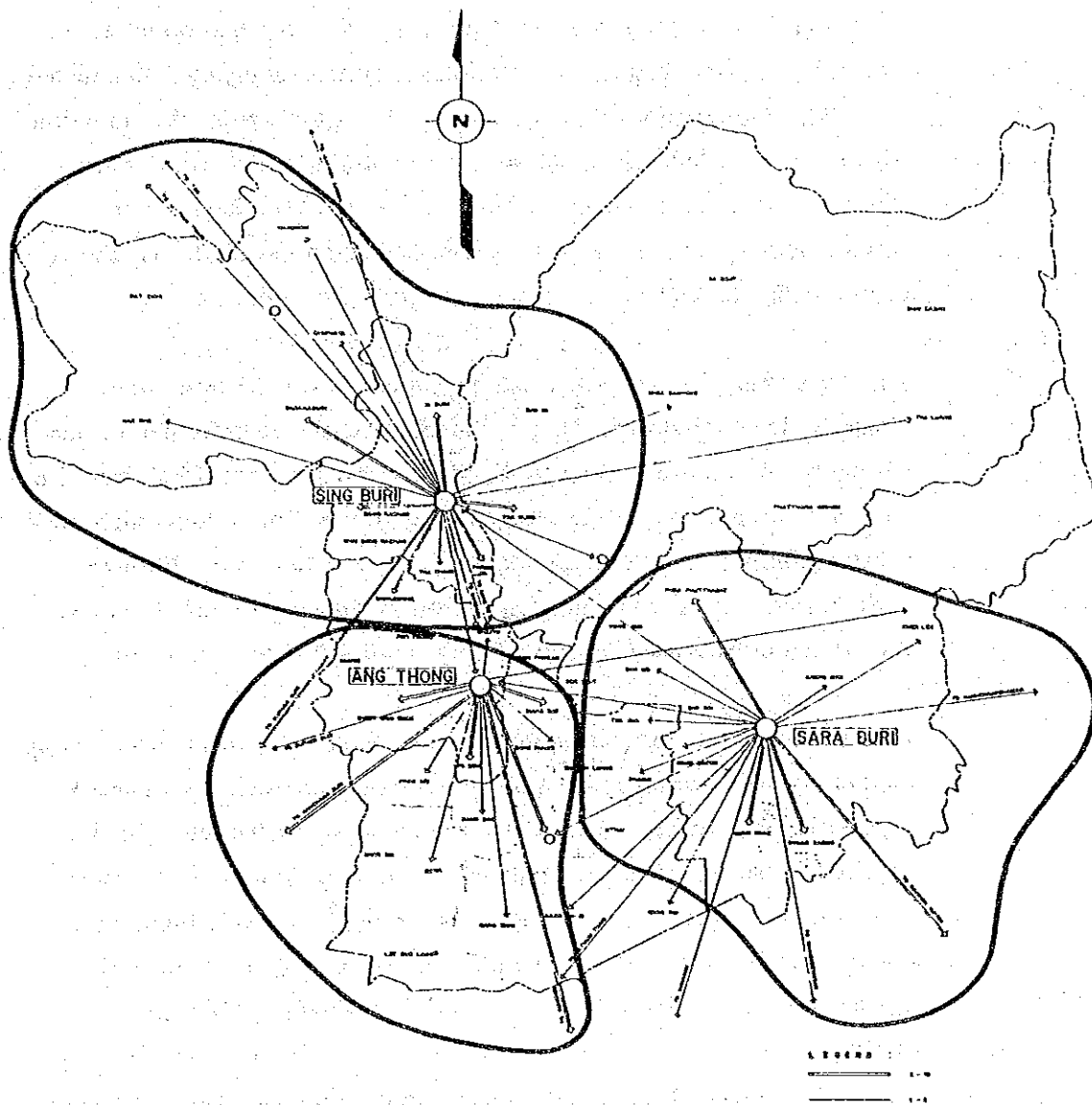


Fig. 4.5 Wholesale Food Markets and Their Market Territories

2) Agro-products Market and Goods Distribution Centers Development

The major commodity generated in the UCR is agro-products. According to the results of the local market survey we conducted in 1989, three major markets can be identified with the function of extensive wholesaling of agro-products, namely, Sara Buri, Sing Buri and Ang Thong. These three markets have their service areas each of which covers several Changwat, as shown conceptually in Fig. 4.5.

The Sara Buri Market Area covers parts of the eastern areas along National Highways No. 2 and 33 and the eastern part of the Changwat Ayutthaya. Sing Buri Market Area covers Chai Nat, Lop Buri and Sing Buri itself. Ang Thong Market Area, of which the urban economy is closely related with Suphan Buri through agricultural inputs and outputs, involves most part of Changwat Ayutthaya Province.

Along with the expansion of domestic market, a local wholesaling market system associated with the central markets in Bangkok especially for fruits, vegetables, and other perishables will be required, instead of the traditional marketing system. In such new system, prices are determined through a well-functioning market mechanism. This modernized marketing system will stimulate the agricultural diversification among farmers.

It is recommended that such local wholesaling markets for agro-products will be developed or renovated in the three cities of Sara Buri, Ang Thong and Sing Buri. As for Ang Thong, its market service area will compete with that of Suphan Buri. However, taking into account its locational advantage and the present potentials, the Ang Thong Wholesale Market will still be feasible because of possibly induced diversification of interactions with the Suphan Buri Economy.

Meanwhile, the locational advantage of the UCR as a gateway to the BMR and the northern and the northeastern regions will potentially make goods distribution centers viable. Sing Buri with the northern hinterland and Sara Buri with the northeastern hinterland are thought to be the potential location of the regional goods distribution centers. However, the market areas of these two distribution centers will be limited only to the areas lower than Nakhon Sawan and Nakhon Ratchasima respectively. These primary regional growth centers are also capable of serving as the interregional goods distribution centers with stronger functions and wider service areas. This aspect is discussed in Sector Report Vol. 6, "Marketing and Distribution".

4.2.3 Encouraging Development of Lower Order Centers

In order to support a wide variety of agricultural activities, urban functions should cover the following major fields:

- Agro-products distribution
- Agricultural service and support
- Agro-processing
- Agro-technologies development

There are 80 human settlement centers in the forms of municipalities and sanitary districts in the UCR. Fig. 4.6 shows a distribution pattern of urban population among these centers and their population changes between 1981 and 1987. Most of the centers suffered from a minus growth or a quite low growth except for a few centers such as Ayutthaya, Sara Buri and Lam Na Rai.

Out of these 80 human settlement centers in the UCR, the notable 20 secondary order centers are identified in the UCR. These centers' urban functions should be noted as well.

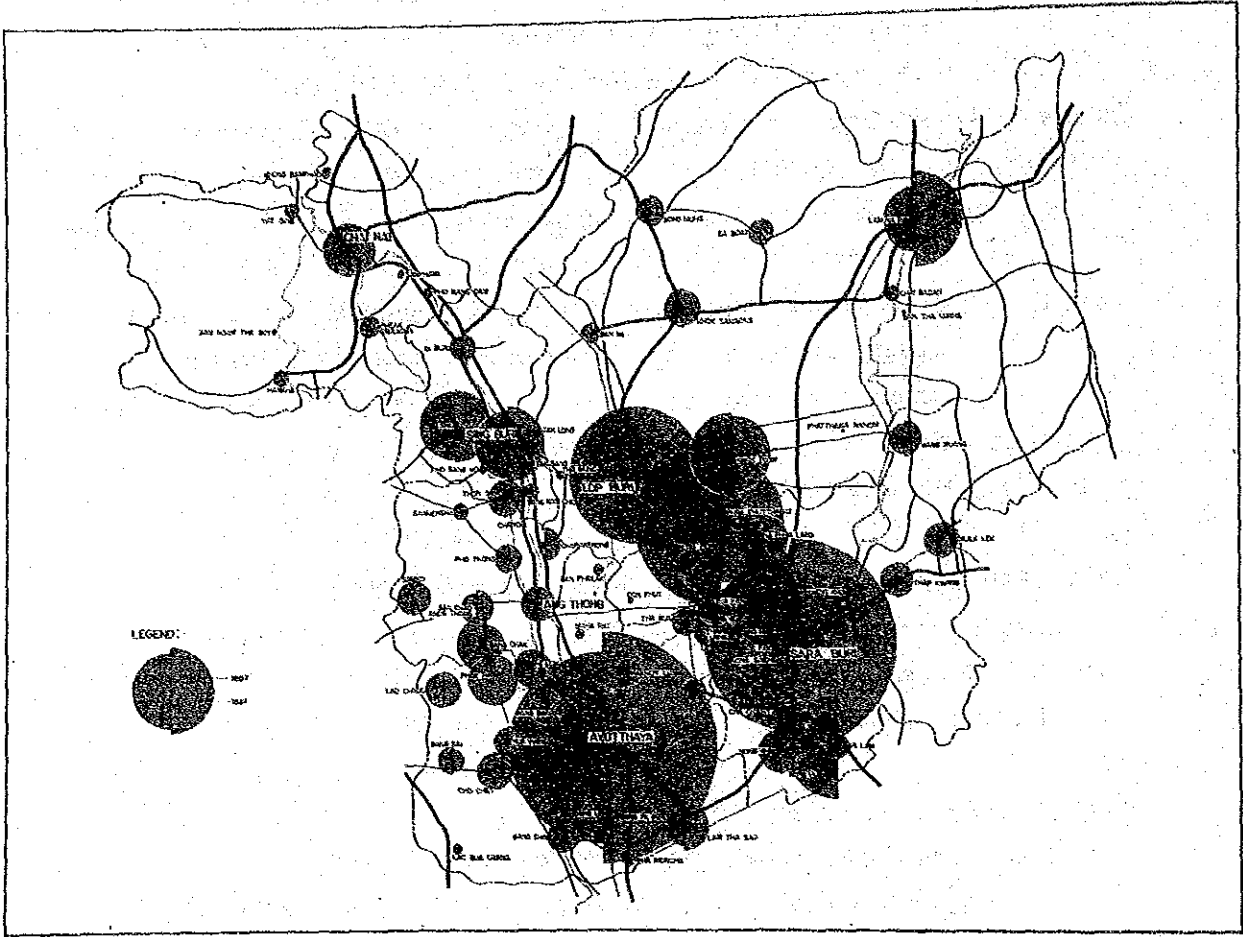


Fig. 4.6 Municipalities and Sanitary Districts

Table 4.6 Sub-Regional Structure and Sub-Region Wise Development Prospects of the UCR

Sub-Region	Primary Center	Secondary Center	Major Hinterland Activities
Sara Buri	Sara Buri Lam Na Rai	Kaeng Khoi Tha Rua Tha Luang Phachi (Kok Mung) Lam Na Rai Wang Muang	A wide variety of industries (agro-processing, local resources based, and urban supported) Upland agriculture intensification, and diversification
Lop Buri	Lop Buri	Nong Muang Khok Samurong Ban Mi	Upland agriculture intensification, and diversification, and agro-processing industry
Phra Phutthabat	Phra Phutthabat		Upland agriculture diversification
Chai Nat	Chai Nat	Wat Sing Hankha	Intensive rice cultivation and crop diversification
Sing Buri	Sing Buri	Sing	Intensive rice cultivation and agricultural diversification, and agro-processing industry
Ang Thong	Ang Thong	San Chao Rong-Thong Pa Mok	Intensive rice cultivation and diversification, and agro-processing industry
Ayutthaya	Ayutthaya	Sena Cho Chet Bang Pa In Kok Mung	Intensive rice cultivation and conservation. Agro-processing and pollution-free industries

1) For Agricultural Support in the Chao Phraya Delta

The western bank areas of Chao Phraya River, especially the areas between the two north-south corridors of National Highways of No. 32 and 340 are advanced paddy production areas. Three significant centers can be identified to be capable of supporting the agricultural activities and agro-products distribution related to the Suphan Buri Economy in these areas, namely, Sena-Chao Chet, San Chao Rong Thong and Sing.

Sena and Chao Chet (Changwat Ayutthaya): This center comprising Sena (Tambon municipality) and Chao Chet (sanitary district) with a population of about 14,800 in 1987 is located along the Provincial Highways No. 3263 and 3111 which provide access to Ayutthaya, Suphan Buri and Bangkok. Because of this locational advantage, a large scale factory (shoes maker) exists and another one (medical) is under construction in the vicinity. The commercial activities in this center are active and now transforming a traditional logistic center based on river transport to a service center based on highway transport.

San Chao Rong Thong (Changwat Ang Thong): This sanitary district with a population of about 9,600, along the Provincial Highway No. 3195, is located just at a midpoint between Ang Thong and Suphan Buri, and functioning as a rice distribution center. This center is important in combining both the Ang Thong and the Suphan Buri Economies.

Sing (Changwat Sing Buri): This sanitary district with a population of about 20 thousand is functioning as a significant agro-service center, located along the Provincial Highway No. 3303 linking Sing with Sing Buri and the western region. This old settlement as a river transport center, however, needs another stimulus to encourage its activities.

2) For Agricultural Diversification in the Upland Area

In order to support the agricultural diversification in the upland area, a number of centers should be noted and encouraged. Those are:

Lam Na Rai (Changwat Lop Buri) and Wang Muang (Changwat Sara Buri): These two sanitary districts are located along the Pasak River and have a significant role to play in supporting the Pasak River Basin development. The former is a center with a population of about 26 thousand, and the latter, about 10 thousand. In 2010, the population of Lam Na Rai will be more than 70 thousand. This center will be capable of being a municipality, and a sub-regional center in the future.

Khok Samrong and Nong Mung (Changwat Lop Buri): These two centers are located on the National Highway No.1. Due to the shift of major inter-regional traffic flows from National Highway No.1 to No.32, these centers' commercial activities have somewhat been depressed. However, these two centers are still important in supporting the diversified agriculture in the vast upland area in Lop Buri. The former is a municipality with a population of about 9,700 and the latter is a sanitary district with 8,500 population.

Phra Phutthabat (Changwat Sara Buri): This considerably large municipality with about 34 thousand population is a local service center as well as a nation-wide domestic tourism center with religious assets. Between 1981 and 1987, however, it shows a significantly negative population growth of - 5.4%. An economic stimulus is necessary so as for this center to become a center capable for supporting agricultural diversification. In this connection, a development concept of "Agro-Polis" may be employed in this center.

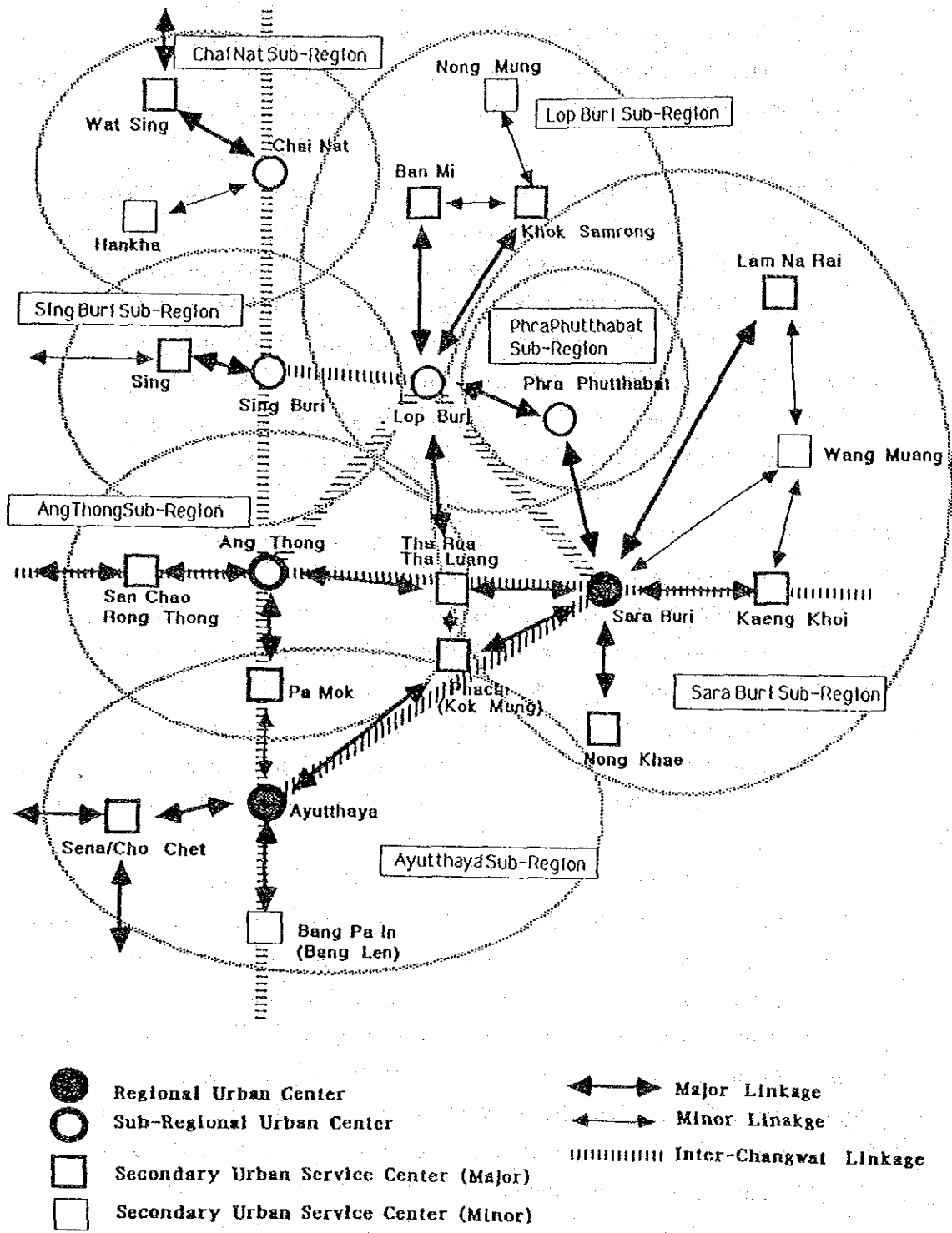


Fig. 4.7 Concept of Human settlement Hierarchy

3) For Railway Transport Centers

A drastic shift in the transportation system of Bangkok from road to rail will be much more crucial in future than at present.

Given this shift in Bangkok, significance of the railway between the UCR and Bangkok would increase as well, because railway is inherently a rapid and efficient transportation. Based on this perspective, Ban Mi (Lop Buri), Tha Rua (Ayutthaya), Phachi (Ayutthaya), Bang Pa In (Ayutthaya), Kaeng Khoi (Sara Buri) should be noted as potential rail transport centers.

4.3 Structure of Human Settlement Centers

Based on all the above discussions, a hierarchical system of human settlement centers is proposed as shown in Fig. 4.7. Major points underlying this proposal are twofold:

- To strengthen regional growth cities which are capable of playing leading roles in boosting the industrialization in the UCR;
- To form a sub-regional human settlement structure centered on the higher ordered centers so that all peripheral rural centers may be linked with the urban service functions.

4.3.1 Strengthening of Regional Growth Centers

Sara Buri City, which has been recognized as a "regional urban growth center" in the National Plan, may be developed as one of primary regional centers for UCR development, or a "new industrial core". This center, in 2010, will be a city with more than 140 thousand population, which is almost equivalent to the present population of Nakhon Sawan. An emphasis should be placed on strengthening of its marketing, distributing, and industrial capabilities for agro-products and local resources, taking into account its another function as a gateway to/from the northeastern region, the BMR and the ESB.

Ayutthaya City is another potential growth center with tourism and industrial supporting functions, and will increase the importance of these functions much more in future than it is recognized at present. Our projection shows that municipal population will double to reach about 130,000 in 2010, but it would be impossible for the city to accommodate this population due to its limited municipal area. In order to put forth proper urbanization while promoting its particular urban amenities land use management of the municipal area and its vicinity area are highly required.

4.3.2 Structure of Human Settlement Sub-Divisions

The UCR consists of eight (8) sub-regions with human settlements centered around major urban centers, namely, Sara Buri, Lop Buri, Ayutthaya, Ang Thong, Sing Buri, Chai Nat, Lam Na Rai and Phra Phutthabat. At the regional level in practice, a definite division of centers' service territories cannot be depicted. They naturally overlap. In this sense, Lam Na Rai may be regarded as a supplementary center of Sara Buri while the service area of Phra Phutthabat may also be influenced by Lop Buri and Sara Buri. Characteristics and development prospects of each sub-regional economy are summarized in Table 4.6.

5. URBAN DEVELOPMENT STRATEGIES AND PROJECTS/PROGRAMS

5.1 Strategic Urban Development: Greater Sara Buri Industrial Core

We propose the strategic development of "Greater Sara Buri Industrial Core (GSIC)" to integrate urban, industrial and agricultural development as a trigger of UCR regional development with the following scheme:

5.1.1 Objectives

The objectives of GSIC development are threefold:

1) To Create a Regional Urban Service Center:

As examined in the preceding sections, one of the critical constraints for UCR development is the lack of the matured urban service centers capable of serving hinterland economies and inviting new business investments because of the region's proximity to and great dependence on the Bangkok Metropolitan Economy. As shown in Section 4.1.1, the weakness of the service sector in the UCR is seen in the fact that the magnitude of per capita service sector output (GRP) in the UCR is 15% of that in Bangkok Metropolis in 1987. Moreover, looking into regional money flow, deposit-to-credit ratios in the UCR are always over the unity (1.0). This means that capitals accumulated in the UCR are floating out and not invested in the UCR because few business chances are found in the UCR.

These findings are shortcomings of the UCR so far. Given some strategies to make use of current movements of Bangkok Economy, however these shortcomings may be changed to advantages. One possibility is that because of skyrocketing of land prices in the BMR, some of investors' eyes are gradually looking at the potentials and the location advantages of the UCR. This should be more stressed as Bangkok Metropolis will be more congested and the ESB Corridor will be more developed because of land price spirals. The investors are always looking for the next target areas which have favorable environment for investment. This momentum is appreciable for UCR development. Given improvement of major infrastructures such as National Highway Route No.1, Outer Ring Road, rail connection with the ESB, and electricity supply and telecommunication systems, the UCR would potentially have a chance to take off, if no serious water problems exist.

A strong magnet should be developed to induce such new activities. The magnet is a urban center which is sufficiently endowed with administrative, financial, commercial, marketing, information, social services, educational and medical functions. Sara Buri should strategically be strengthened so as to play such magnetic role.

2) To Create a New Inland Industrial Base

Thai industrialization has been encouraged with a stress on the seaboard development. The policy concept and investment for industrialization have come from the sea. However, most of the Thai resources exist in inland. The industrialization for second generation should highlight more the interface between the seaboard and the inland activities, taking into account the increasingly expanding domestic demand as well as export market. In other words, policies should focus on industrial integration of "traditional agriculture and modern industry/technologies".

The UCR is located at the midpoint between the both activities. This implies an important role of UCR development in the next generation of Thai industrialization. In this conjunction, we propose to develop a national inland industrial base in the UCR and centered specifically Sara Buri.

To support this argument, four findings are noted: (1) the UCR is rich in agricultural resources with potentials of agricultural diversification; (2) the collection and distribution of major agricultural products have been concentrated in the UCR with access to vast hinterlands; (3) the momentum of newly industrial locations has already been spread over in the norther corridor over a 50 km radius zone from Bangkok; and (4) infrastructures to support industrial activities have been and will be improved. These are positive factors to encourage the development of a new inland industrial base in the UCR.

3) To Create a Center Integrating Inter-regional Projects

There exist the three proposals of large scale inter-regional projects which will affect UCR development, i.e., (1) Pasak River Basin Development Project; (2) Improvement of accesses to the ESB by providing Bangkok Outer Ring Road and the rail connection between Kaeng Khoi and Klong Sip Kao; (3) Energy Center Project.

Effective utilization of these infrastructure projects is a critical issue in the national as well as the UCR development context. For this end, a bowl is necessary to capture the integrated benefits from these projects to create new value-added activities. The GSIC is that bowl.

5.1.2 Selection of Sara Buri and its Vicinities

An integrated center with the above objectives is delineated in the area centered on Sara Buri. A question will be raised: why should the location be Sara Buri despite that Ayutthaya is another potential center? There is no denying that Ayutthaya has geographical advantages for industrial location and activities such as highway transport node, proximity to the Bangkok Economy and Dong Muang Airport and so on. However, the reasons are given as follows:

1) Geological and Environmental Conditions

The most critical constraint in Ayutthaya is the fact that Ayutthaya and its vicinities are environmentally sensitive and subject to chronic floods. Developments in this area will not only damage the environment in the area itself, but will also cause significant environmental impacts on the lower part of the Chap Phraya River Basin where Bangkok exists. Once negative impact is given, therefore, it will be very costly to recover damages.

On the other hand, Sara Buri and its vicinities have less fear for environmentally negative impacts due to their geological conditions. Moreover, as discussed in the report on water and agriculture, Pasak River Basin Development Project is expected to ensure the water availability for urban and industrial activities.

2) Comparison of Locational Advantages

Ayutthaya is located in the area under the direct influence of Bangkok and just at the junction from the northern and the northeastern corridors. This must be a strong advantage. However, the condition of being closer to the Bangkok Economy is not necessarily a superior advantage for development of the industrial core with the aforementioned objectives. From a planning point of view, the current economic and industrial movement in Ayutthaya and its vicinities are too rapid to depict a

well-organized spatial structure in the long run. Since the land prices have already been so high, the public investment to direct the development in a balanced manner will hardly catch up with the actual movement. Taking into this and its environmental sensitivity as well, the excessive development in Ayutthaya Area should be discouraged rather than publicly emphasized.

Regarding the accessibility to the hinterland, Sara Buri Area has almost same advantage as Ayutthaya Area. More importantly, Sara Buri Area has direct access to agricultural activities in the vast upland areas where agricultural diversification is anticipated. The benefits from the Pasak River Basin Development will be combined with the industrial activities in Sara Buri Area.

3) Urban Development Potentials

In view of urban growth potentials, only Ayutthaya and Sara Buri Cities show exceptionally growing trend in the UCR. The degree of accumulations of urban service functions are almost the same, but the characteristics of the urban locality are different. Ayutthaya City, having historical and cultural assets, has a considerable potential to be a tourism center, but on the other hand, Sara Buri City is a traditional trading and marketing center for agricultural products. So much so, the two cities are to grow toward different directions. As a service center to support various agricultural and industrial activities, Sara Buri City is assessed to be able to cumulate more diversified and regionally extensive functions.

Urban amenities exist to an extent in Ayutthaya City, but a more important finding is that Sara Buri City has a spatial structure which is expandable without much drainage and water problems, given urban infrastructures in an appropriate manner. On the contrary, Ayutthaya City has a spatial limit.

5.1.3 Spatial Structure of the Greater Sara Buri Industrial Core

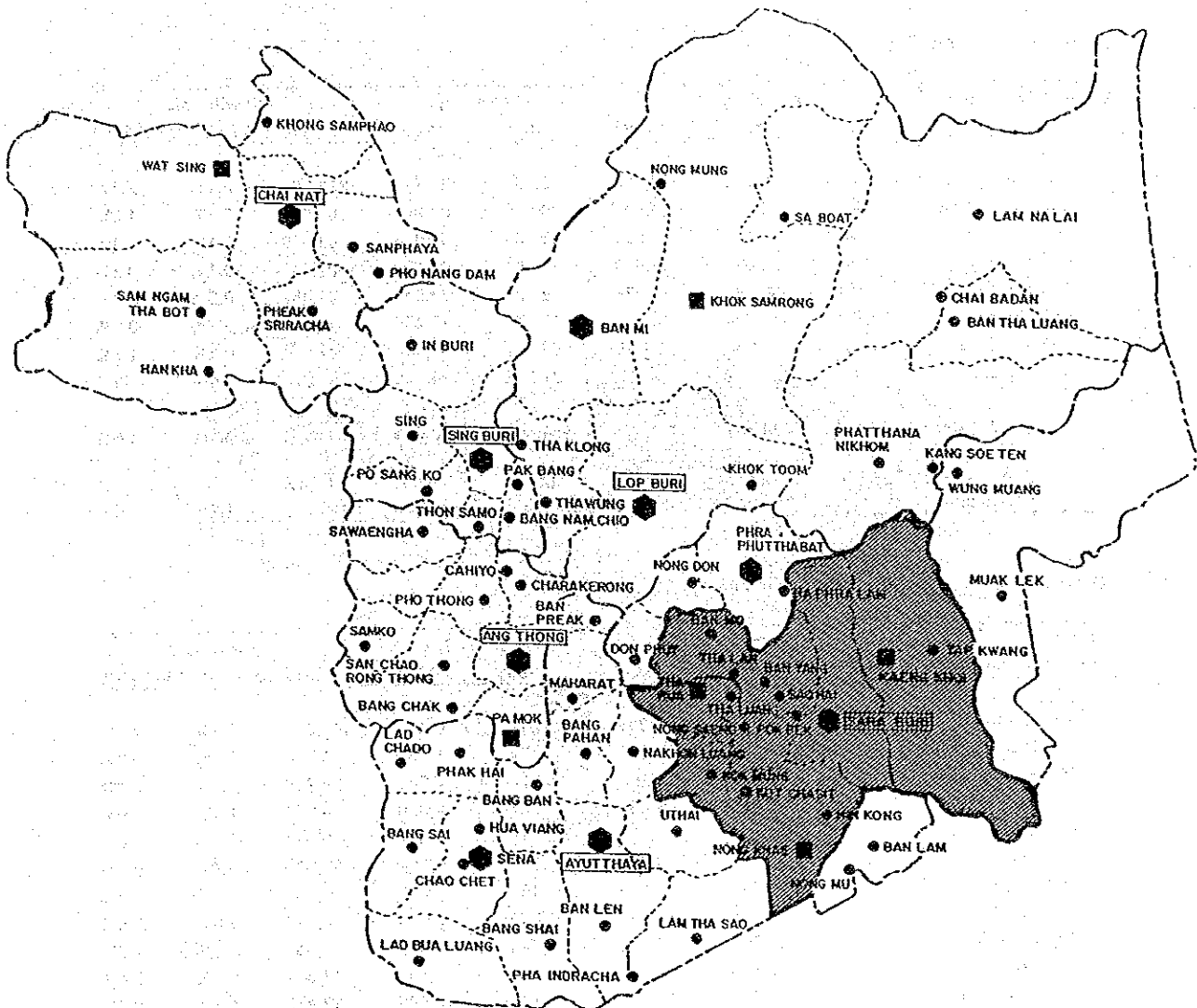
Although the GSIC is proposed as a regional center for new urbanization and industrialization in the UCR, this center may not be composed of one core but four sub-cores as mentioned in Section 4.2.1., namely, the Sara Buri Sub-core, the Kaeng Khoi Sub-core, the Tha Rua-Tha Luang Sub-core, and the Nong Khae Sub-core. The GSIC, thus, is a multi-core urban system which consolidates several urban centers. The spatial structure of the GSIC will be described as follows:

1) Area and Population

The GSIC is an integrated area covering eight (8) Amphoe, of which 6 Amphoe are in Changwat Sara Buri and two (2) Amphoe in Changwat Ayutthaya, with a total area of about 2,360 sq. km or 14% of the UCR as shown in Fig. 5.1. There are fifteen (15) urban centers defined as municipalities and sanitary districts in the GSIC. A total of the urban areas (based on the present jurisdiction) amounts to about 71.2 sq. km, which represents 3% of the total area of the GSIC at present. The urban areas will expand in the future along with the growth of urban and industrial activities to almost double in 2010.

As of 1987, population in the GSIC is about 389 thousand, of which about 153 thousand, or 35.4% is urban population. Based on our population projection as shown in Table 5.1, a total population in the GSIC will be 623 thousand in 2010 with a 1.6% growth rate, compared with 1.1% in the UCR. The urban population will increase at a higher growth rate of 3.3% and be approximately 324 thousand. Accordingly, the urban population ratio will also increase up to 52% in 2010. The future distribution pattern of urban population in the GSIC is depicted as follows and shown in Fig. 5.2.

Sara Buri Central Core	: 150 thousand
Kaeng Khoi Sub-core	: 40 thousand
Tha Rua- Tha Luang Sub-core	: 70 thousand



- LEGEND :
- MUANG MUNICIPALITY
 - TAMBOL MUNICIPALITY
 - SANITARY DISTRICT
 - CHANGWAT BOUNDARY
 - AMPHOE BOUNDARY

Fig. 5.1 Planning Area of the Greater Sara Buri Industrial Core Development

Table 5.1 Population in the Greater Sara Buri Industrial Core (GSIC)

(1) Population by Amphoe

Code	Name of Amphoe	Actual 1)		Projection 2)		Growth Rate		
		1977	1987	1996	2001	2010	1977-87	1987-2010
601	Muang Sara Buri SRB	96,798	118,866	142,452	161,171	201,280	2.1%	2.3%
602	Kaeng Khoi SRB	65,240	69,423	79,616	87,902	105,051	0.6%	1.8%
604	Ban Mo SRB	41,665	46,259	50,756	54,678	62,519	1.1%	1.3%
608	Sao hai SRB	25,639	25,498	25,591	26,238	27,442	-0.1%	0.3%
609	Nong Khae SRB	69,260	75,736	79,486	83,540	91,367	0.9%	0.8%
610	Nong Saeng SRB	14,734	15,820	16,603	17,450	19,085	0.7%	0.8%
402	Tha Rua AYT	46,933	50,929	58,407	64,486	77,066	0.8%	1.8%
411	Phachi AYT	28,530	29,103	31,932	34,400	39,333	1.1%	1.3%
GSIC Total		388,799	431,634	484,842	529,865	623,144	1.1%	1.6%
Share of GSIC		15.9%	15.7%	16.5%	16.9%	18.0%		
UCR Total		2,450,646	2,741,000	2,932,000	3,134,000	3,459,000	1.1%	1.0%

(2) Urban Population by Municipality and Sanitary District

Amphoe Code	Name of Center	Actual 1)		Projection 2)		Growth Rate		
		1981	1987	1996	2001	2010	1981-87	1987-2010
601	Saraburi	47,236	56,801	82,512	100,401	141,620	3.1%	4.1%
	Pok Pek	1,057	1,081	1,184	1,236	1,322	0.4%	0.9%
602	Kaeng Khoi	10,920	11,193	15,122	17,961	24,254	0.4%	3.4%
	Tap Kwang	8,854	9,451	11,546	12,620	14,676	1.1%	1.9%
604	Ban Mo	5,489	5,300	5,418	5,412	5,349	-0.6%	0.0%
	Tha Lan	9,747	10,002	12,942	15,002	19,390	0.4%	2.9%
608	Sao Hai	1,616	2,120	3,194	4,049	6,146	4.6%	4.7%
	Ban Yang	1,355	1,106	1,800	2,036	2,518	-3.3%	3.6%
609	Nong Khae	11,551	12,218	15,744	17,985	22,640	0.9%	2.7%
	Kot Chasit	2,834	3,987	6,332	8,402	13,851	5.9%	5.6%
	Hin Kong	10,938	10,215	12,735	14,405	17,817	-1.1%	2.4%
610	Naong Saeng	1,329	1,427	1,686	1,834	2,113	1.2%	1.7%
402	Tha Rua	7,080	7,823	10,057	11,657	15,067	1.7%	2.9%
	Tha Luang	11,374	13,569	19,061	22,848	31,368	3.0%	3.7%
411	Kok Muang	6,745	6,537	6,655	6,651	6,584	-0.5%	0.0%
Total of Urban		138,125	152,830	205,988	242,499	324,715	1.7%	3.3%
Urban Ratio (%) in the GSIC		-	35.4%	42.5%	45.8%	52.1%		

Source:

- 1) Department of Local Administration
- 2) The Study Team

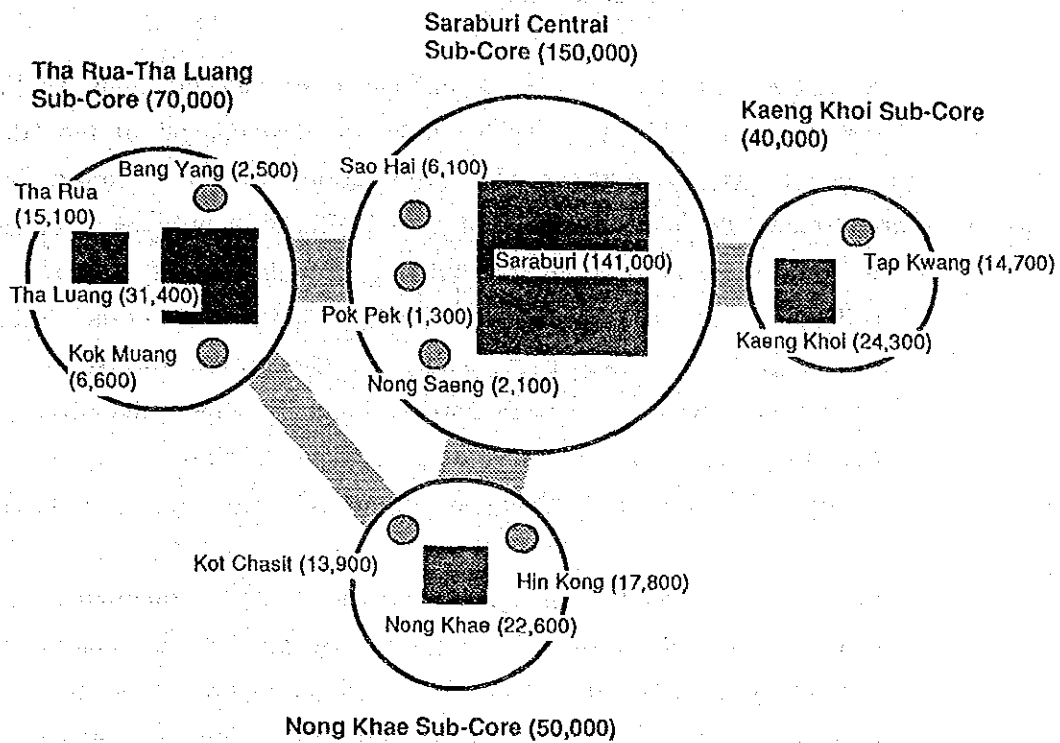


Fig. 5.2 Urban Population Distribution In the GSIC In 2010

Nong Khac Sub-core : 50 thousand

Thus, the population projection shows that urbanization will rapidly take place, and the urban economy with a magnitude of 300 thousand population will be activated in the UCR.

2) Urban Functions Allocation

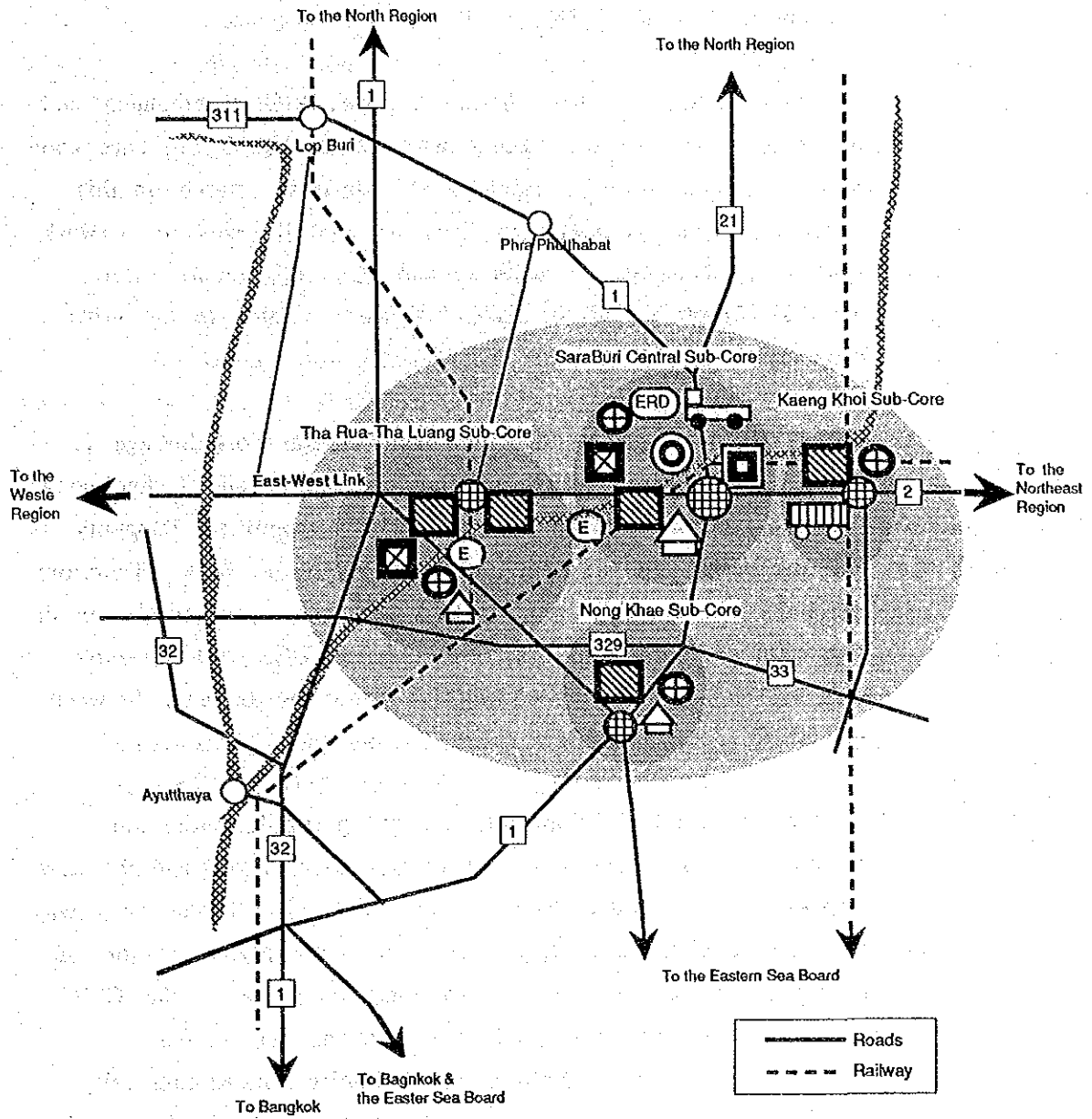
Sara Buri City has to play significant roles and functions as the central core. This is a key to successful development of the GSIC. The central management and information functions should be facilitated in this center. For this end, the central government policies are necessary to support the growth of this center. Relocation of the certain types of metropolitan functions existing in Bangkok into Sara Buri should be encouraged through providing administrative incentives, e.g., higher educational facilities, research and development type institutes, higher medical facilities and headquarters of selected service industries.

Other centers should also be grown with specific functions. Each center does not necessarily possess extensive urban functions, but needs to foster some specific functions to share and be organized in the entire GSIC Urban Function. Fig. 5.3 shows a proposal of urban functions allocation system.







3) Industrial Support

Facilities and measures for industrial support should be incorporated in the development of the GSIC. The necessary facilities for this end are proposed as follows:

- Industrial estate development
- Industrial promotion zone
- Energy supply center
- Distribution center and truck terminal



Urban Service Functions

-  Commercial and Marketing
-  Human Resources Development & Business Incubator
-  Information and Administrative
-  Housing
-  Educational and R&D
-  Medical and Social Services

Agriculture & Industry Related Service Functions






-  Industrial Estate/Promotion Zone
-  Agriculture Related Industry & Distribution
-  Goods Distribution
-  Inter-Modal Transport Facility
-  Energy Supply Base

Fig. 5.3 Urban Functions Allocation in the GSIC

4) Transport Network System

Transport network system should support GSIC development and it should be structured in such a way that the GSIC will have good access to major material suppliers and markets. Based on this concept, several proposals to form an overall transport network systems are discussed in depth in Part II of this report. Here, emphasis is placed on the following issues related to the urban economy of the GSIC:

For GSIC development, the inter-regional transport linkage is crucial especially to utilize the human, capital and technological resources accumulated in the Bangkok Metropolitan Economy and the basic materials and port functions in the ESB. Therefore, the links with Bangkok and the ESB should be emphasized. In the long run, a rapid transit system to link the UCR with Bangkok may be explored to create intensive economic linkages between the GSIC and the Bangkok Economy.

In the industrial development context, particular attention should be given to the inland water way to Bangkok and the new railway link with Kaeng Khoi and the ESB. The inland water way has been a significant transportation to support the location of agro-products collection and distribution functions in the GSIC. Although the large scale public investment for further facilitating this transportation would hardly be economically feasible, the importance of this transportation should be noted. On the other hand, the new rail link will provide several ideas to facilitate the goods distribution functions in the GSIC such as the inland depot and the container yard. The explicit rationales to make these facilities feasible or necessary cannot be found out at present. These facilities hardly function as a magnet to attract new industries, but depend on the magnitude of industrial accumulation to use them. Hence, the development of these facilities would be realistic in the medium and long run, but it is recommended that the land for them should be reserved at an early stage

Meanwhile, the East-West Link is important to integrate the dispersed regional activities into the GSIC Economy. This link will be a physical backbone of the GSIC. Furthermore, an intra-regional linkage among sub-cores should be reinforced in the GSIC. Because the GSIC is based on a consolidated multi-core urban system, the lack of well-organized transport system will inevitably loose the principal meaning of GSIC Development. In the same context, linkages among the centers of Changwat need to be reinforced for the UCR as a whole.

5.1.4 Integrated Development System

GSIC Development calls for the project coordination and integration, both inter-regional and inter-sectoral, with a purpose that such large scale development will efficiently be implemented. A challenge to create a regional urban and industrial base is thus the process of this coordination involving all parties such as the central government, state enterprises, local authorities and various private sectors. In this regard, considerations should be taken into the following projects:

1) Pasak River Basin Development

Pasak River Basin Development should be coordinated with GSIC Development in terms of water supply and the linkages between agricultural diversification, marketing and processing so that benefits from the development projects under both Pasak River Basin Development and GSIC Development may be multiplied.

2) Inter-City Solid Waste Collection and Treatment System

Under the present system, each local authority has to be responsible for solid waste treatment by itself. This system is inefficient in the use of manpower and machines. An inter-city solid waste collection and treatment system should be explored based on a notion that the GSIC is one unity of urban development in pursuit of the economy of scale. For this end, inter-city coordination is indispensable. We propose that the

Local Authorities Association be organized for this common objective. The work itself may be privatized under the management of that association. This scheme is discussed further in Sector Report Vol. 2, "Urban Management".

3) Waste Water Disposal Development

The waste water disposal and management system in the Sara Buri Urban Core should be developed with a high priority. However, as discussed in the following section, urbanization will spread over the present jurisdiction of the Sara Buri Municipality in the future. Therefore, the plan for the service area beyond the present municipal boundary will be needed through coordination with relevant authorities.

4) Urban Gas Supply System

The natural gas pipeline has been laid in the UCR for the industrial purpose and as an inter-regional energy supply center. For Sara Buri urban development, this energy source may be utilized for the urban purpose especially in creating urban amenity. Further argument in this regard is made in Sector Report Vol. 7 "Energy".

5.1.5 Sara Buri Urban Development Guidelines

As a center of the GSIC, the Sara Buri Urban Core should be developed with great emphasis. The Department of Town and Country Planning (DTCP) has already prepared the Comprehensive (General) Town Plan for the Sara Buri Municipality and its vicinities with a planning area of 39.3 sq. km, of which the area of Sara Buri Municipality is 20.1 sq. km. The target year is 2005 when the population is assumed to be about 85 thousand.

Our proposal for the target year 2010 has a broader and longer framework in terms of urbanization and urban functions based on more positive assessment of its urban growth potential. Although the basic

structure delineated in the DTCP's plan is not necessary to be altered so much, development framework is needed to be reconsidered.

1) Urban Development Framework

Our proposed framework is summarized in Table 5.2. It is assumed that the urban population will be about 142 thousand in 2010, compared with 59 thousand as of 1988. The population growth rate between 1987 and 2010 is assumed to be 4.1% per annum, compared with the 3.2% growth between 1981 and 1988. On the other hand, the DTCP's framework in 2005 shows 2.2% growth, which is lower than the past trend.

The urbanized area will expand accordingly. Given an assumption that urbanization will proceed with a gross population density of about 3,300 persons per sq. km¹, the urbanized area will be about 43.0 sq. km in 2010. Since the present urban area (the municipal area) is 20.1 sq. km, the urban area will be more than 2 times as wide as that at present, or additional area of about 23 sq. km will be urbanized by 2010. The DTCP's urban planning area covers an area of 39.3 sq. km. As far as the planning area is concerned, the 3.7 sq. km expansion is necessary.

In turn, housing demands will increase as well, and much emphasis should be placed on provision of houses. Increase rate in housing demands is usually larger than that in population, due to decreasing family size, increasing demand for rebuilding and other factors. According to actual data, the number of houses increased at 9.1% per annum, compared with 3.2% growth of population. Taking into account the decreasing family size, we projected that total number of houses will be about 33,700, compared with 11,623 in 1988. This means that additional demand will be more than 22 thousand. This implies that 1000 units of houses will annually be constructed up to 2010. This will bring

¹ This gross density is thought to be an upper limit to build the green-rich urban environment in the regional city. For reference, the present density (within the municipal area) is 2,930 persons/sq. km.

Table 5.2 Sara Buri Urban Development Framework

		1981	1988	1996	2001	Increase	
						2010	1988-2010
Population		47,236	59,062	82,512	100,401	141,620	82,558
Urban Area *1)	(ha)	2,013	2,013	2,695	3,192	4,292	2,279
	(Rai)	12,581	12,581	16,841	19,952	26,822	14,241
No. of Houses		6,307	11,623	18,500	23,349	33,719	22,096
Population Density	(prs/ha)	23.5	29.3	30.6	31.5	33.0	1.12
	(prs/Rai)	3.75	4.69	4.90	5.03	5.28	1.12
Housing Density	(units/ha)	3.13	5.77	6.87	7.31	7.86	1.36
	(units/Rai)	0.50	0.92	1.10	1.17	1.26	1.36
Family Size	(prs/fly)	7.5	5.1	4.5	4.3	4.2	0.83

Source: The Study Team

Notes: 1) The urban area in 1981 and 1988 is the municipal jurisdiction.

about a construction boom in Sara Buri City.

2) Urban Structure

A major issue is how to separate the major inter-regional traffic flows on the National Highway Route No.2 and Route No. 1 from the intra urban traffic flows in order to eliminate bottlenecks of these stem traffic flows as well as avoid congestions in the city. As for the north-south traffic flow on the Route No.1, the Sara Buri Bypass which is under construction will provide partial solution to this problem. As for the traffic on the Route No.2, because of a strict land constraint, a bypass is hardly planned. Some alternative solution is necessary, for instance, improvement of the intersection of the Routes 1 and 2, or provision of another detouring route.

Regarding the urban structure, the Sara Buri Bypass will provide a new axis of urban structure and great potentials for land development. This new urban axis should properly be utilized for the future expansion of the urban area.

Fig. 5.4 shows a proposed conceptual structure, as a guideline, of the Sara Buri Urban Area, taking into account the DTCP's planning concept. A further study is required for this guideline to be developed into an authorized development master plan by involving local authorities concerned.

5.1.6 Administrative Arrangement

In view of urban development, administrative arrangement/coordination is necessary to put GSIC Development forth with special reference to the following aspects:

- 1) The Comprehensive (General) Town Plan, which is presently effective, needs to be amended and planning area should be expanded.
- 2) Expansion of the municipal boundary of Sara Buri City will be necessary, or a system of coordinating local authorities will be needed for the urban utility management.
- 3) As for waste water disposal system development, in the PWD's program, Sara Buri Municipality has been listed as one of those under the group III which is meant to be given third priority by Public Works Department. With special attention to its growth potential, Sara Buri will need to be given higher priority.
- 4) Full participation and involvement of relevant local authorities in development will be essential. The private sector should also be involved from the planning stage and at not only the central but also the local level.

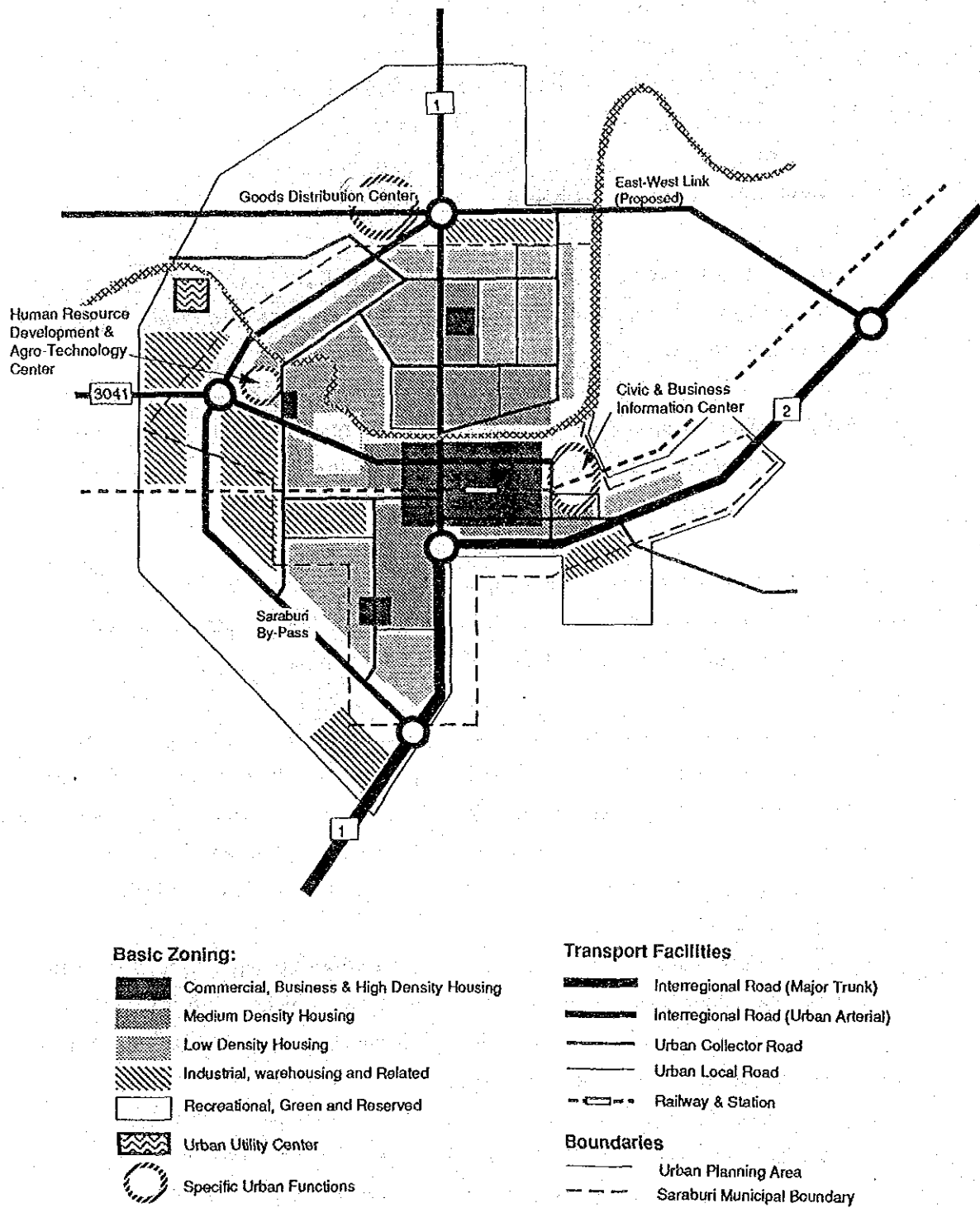


Fig. 5.4 A Proposed Urban Structure Plan In Sara Buri Urban Area

5.2 Projects/Programs In Urban and Human Settlement Development

Integrating all discussions launched so far, the following projects and programs are recommended in urban development context. Recommendations involve the phasing as follows:

- (1) Short-term: within the 7th National Plan (1992 - 1996);
- (2) Medium-term: within the 8th National Plan (1997 - 2001), or on more and less 10 years perspective;
- (3) Long-term: with the 2010 target, or more than 20 years perspectives.

Since urban development must inherently be related to various productive and service sectors, some of them are overlapped with the proposals in the other sectors. The projects/programs are packaged in three, namely,

- Strategic Regional Center Development Project,
- Sub-Regional Urban Centers Basic Urban Needs Project, and
- Secondary Order Center Development Project.

Table 5.3 shows a summary of all the projects/programs proposed in the urban and human settlement development sector.

5.2.1 Strategic Regional Center Development Project

Selected urban development projects/programs are proposed to be undertaken under a package of "Strategic Regional Center Development" which focuses mainly on the GSIC development.

1) Short-Term Project/Programs

In the short run, a study should be conducted for the Greater Sara Buri Industrial Core Development in order to prepare a comprehensive investment program and examine feasibility of urgent projects. At the same time, guidelines should be prepared for urbanization and industrial location. This work should urgently be undertaken in order to avoid the disorderly

Table 5.3 Projects/Programs for the Urban and Human Settlement Development

<u>Package</u>	<u>Projects/Programs Component</u>
A.	Strategic Regional Center Development (Greater Saraburi Industrial Core Development)
(1)	Short-Term Projects/Programs
A1	Implementation of Development Master Plan Study for the Greater Saraburi Industrial Core Project (Investment Program and Feasibility Study)
A2	Preparation of "Guidelines for Industrial Locations and Urban and Housing Development in both Ayutthaya and Saraburi Sub-Regions
(2)	Medium-Term Projects/Programs
A3	Implementation of Urban Utilities and Infrastructure Projects including:
A31	Expansion of Water Supply Capacity and Facilities in the GSIC
A32	Sewerage System Development in Saraburi Urban Area
A33	Acceleration of Urban Streets Network Development in Saraburi Urban Area, Tha Rua-Tha Luang and Kaeng Khoi Sub-Cores.
A34	Solid Waste Collection and Treatment System in the whole GSIC
A35	Inducement of Urban Gas Supply System in Saraburi Urban Area
A36	Expansion of Telecommunication Capacity in the GSIC
A37	Improvement of Inter-regional Bus Terminal in the Saraburi City
A4	Development of a Housing Complex (Saraburi New Town) by the Public Initiation, with the Private Sector Involvement.
A5	Promotion of Redevelopment Projects in the Saraburi Central Business District
A6	Development of Goods Distribution Terminal and Improvement of Food Wholesale Market in Saraburi City
A7	Preparation of Guidelines for Relocation of Bangkok-Based Facilities to the GSIC.
(3)	Long-Term Projects/Programs
A8	Inducement of Higher Metropolitan Functions (Higher Educational and Medical Facilities)
A9	Preparatory Work a Rapid Transit System Development between Bangkok and Saraburi.

(Cont'd)

Package Projects/Programs Component

B. Sub-Regional Center Basic Urban Needs Projects

(Ayutthaya, Lop Buri, Sing Buri, Ang Thong, and Chai Nat Urban Areas)

(1) Short-Term Projects/Programs

- B1 Implementation of Flood Mitigation Projects in Sing Buri, Ang Thong, Chai Nat
- B2 Preparation of an Overall Investment Guideline/Policies (Long-Term) for Basic Urban Needs Development Covering All Sub-Regional Urban Centers
- B3 Implementation of Ayutthaya Tourism Promotion Projects and Embarkment of "Historical City Ayutthaya" Development
- B4 Implementation of Sewerage System Project and Solid Collection and Treatment System development in Ayutthaya Urban Area

(2) Medium-Term Projects/Programs

- B5 Preparation of Long-Term Public Investment Master Plan by the Local Authorities
- B5 Improvement of Inter-Regional Bus Terminals in All Centers.
- B6 Implementation of Basic Urban Needs Projects in All Centers, based on the Investment Master Plan (with Emphasis on Solid Waste, Waste Water Disposal, Water, Telecommunication Systems Projects)
- B7 Development/Improvement of Food Wholesale Markets in Ang Thong and Sing Buri
- B8 Development of Goods Distribution Center in Ang Thong
- B9 Development of "Agro Technologies and Diffusion Center (ATDC)" in Lop Buri
- B10 Tourism Promotion Projects for "Historical City : Lop Buri", and "River-Side Explore Tourism Center" in Chai Nat

(3) Long-Term Projects/Programs

- B11 Acceleration of Implementation of the Basic Urban Needs Projects in All Centers
-

(Cont'd)

Package Projects/Programs Component

C. Secondary Order center Development Projects/Programs

(1) Short-Term Projects/Programs

- C1 Preparation of Guidelines for Secondary Order Center Development with Emphasis on Agricultural and Community Service Functions
- C2 Implementation of Critical Projects in Accordance with the Guidelines (Proposed by the Local Authorities)

(2) Medium- and Long-Term Projects/Programs

- C3 Preparation of Long-Term Public Investment Plans by Local Authorities
 - C4 Implementation of the Planned Projects/Programs.
-

development with little environmental considerations. The private sector will immediately respond to these investment program and industrial locational guidelines of the GSIC because that investment pressures are just around the corner.

2) Medium-Term Projects/Programs

In the medium run, basic urban infrastructure projects should be implemented with special emphasis on sanitary utilities such as solid waste collection and treatment in the GSIC as a whole and sewerage system in the Sara Buri Urban Area. Basic infrastructures to cope with urbanization are needed to be provided in this phase. Expansion of telecommunication capacity and water supply capacity as well as development of the urban roads network and inter-regional bus terminal are essential projects.

Redevelopment of central commercial areas should be encouraged through good coordination between the local authority and the private sectors. In connection with the

strengthening of commercial function, the regional truck terminal and goods distribution center project should be feasible.

For provision of housing, development of medium-scale housing complex or a satellite new town may be initiated by the public sector within Sara Buri Urban Area. This attempt shall be a prototype to encourage and manage the private sector's housing development.

3) Long-Term Projects/Programs

In the long run, Sara Buri shall be a center with higher metropolitan functions such as higher educational, medical and recreational facilities. The central government is recommended to push relocation of these metropolitan functions from Bangkok to Sara Buri. In a longer perspective, a rapid transit system between Sara Buri and Bangkok may be considered.

5.2.2 Sub-Regional Urban Centers Basic Urban Needs Project

This package includes basic urban infrastructure projects in sub-regional urban centers such as Ayutthaya, Sing Buri, Ang Thong, Lop Buri and Chai Nat. The proposed projects/programs are indispensable and basically necessary for these centers to function as sub-regional centers.

1) Short-Term Projects/Programs

Flood problems in urban centers should urgently be eliminated, otherwise urban economies could not stably grow. For fear of economical damages by occasional floods, private investments hardly occur, thereby leading to stagnation of the urban activities. Flood mitigation projects are basic and indispensable in Ang Thong, Sing Buri and Chai Nat.

Development of basic urban utilities and sanitary facilities of, at least, solid waste collation and treatment system and water supply

should be more accelerated in all the cities.

Ayutthaya, as a regional tourism center, should be developed in accordance with the Tourism Master Plan provided by the Tourism Authority of Thailand (TAT), which is reviewed in Part III in this report. The "Historical City Ayutthaya" projects should be started as soon as possible by taking the present chance in which tourism is rapidly growing. As a basic infrastructure, the sewage treatment system development should be an urgent project in Ayutthaya Urban Area.

It is also recommended that a detailed urban development study be carried out to prepare appropriate guidelines for public investment in these sub-regional urban centers development in the short-run.

2) Medium-Term Projects/Programs

A main theme in this phase is the strengthening of urban economy in each center through injecting economic stimulus so as for each center to make its particular function. For this purpose, the following projects are recommended:

- Agro-products wholesaling markets will be improved or newly developed in Sing Buri and Ang Thong. Moreover, goods distribution center will be set up in Ang Thong taking into account its locational advantage and potential geographical extent of its market (this project is examined in detail in Sector Report Vol. 6, "Marketing and Distribution").
- Human resource development and Research & Development functions shall partly be strengthened in Lop Buri in association with Sara Buri. The "Agro-Technologies and Diffusion Center (ATDC)" should be developed in Lop Buri. The ATDC shall function as the center which provides a wide variety of activities related to development of upland agriculture; development of applied technologies, agro-processing and marketing, farmers' training

and so on.

- Tourism development is also emphasized as a significant stimulus of urban economy. Lop Buri City should be promoted as one of the potential tourism places, where tourism industry should be encouraged by the private sector. Sewerage system development should be carried out. Tourism potential of Chai Nat should also be noted. The River-Side Explore Tourism Center is recommended to be developed in association with TAT's promotion.

- The existing inter-regional bus terminals are all congested and not so functional. Improvement or relocation projects are needed to be undertaken. Expansion of telecommunication capacity is also important to support urban economic growth.

3) Long-Term Projects/Programs

In the long run, all the centers are expected to be capable of functioning as sub-regional urban centers to support their hinterland activities. The urban infrastructures necessary for urban economic expansion should additionally be developed. Based on the study to be carried out in the first phase, public investment shall be accelerated. Emphasis should also be placed on the waste water disposal system development because of their particular location: alongside the Chao Phraya River Basin.

5.2.3 Secondary Order Center Development Project

As discussed in Section 4.2.3, there exist twenty (20) secondary order centers which will have substantial roles to play for supporting and serving their hinterland activities. These are the centers of agricultural inputs and outputs as well as of community services. Development of these centers is extremely significant for social development as well.

1) Short-Term Projects/Programs

The central government should make the guidelines for development standards to meet the basic needs of secondary order centers' basic needs, with reference to educational and medical services, public transportation facilities, marketing and commercial activities, nonformal educational and social welfare facilities, and urban utilities and infrastructures. In response to the guidelines and their specific urban functions to be strengthened, each center should have its own development and investment programs on long-term perspectives. Such a systematic planning approach would be important to make budget allocation effective both at the levels of the central government and local authorities.

2) Medium and Long-Term Projects/Programs

Establishment of a local center development system should be pursued on a long term basis. Institutionally, several secondary order centers should change their juridical status from sanitary district to municipality. The number of the candidate centers will be eleven as mentioned in Section 3.2.

5.3 Implementation and Development Management

A major issue is how to organize the administrative and financial system to implement the planned projects/programs efficiently and effectively for regional development. Unlike the ESB Development based on large scale national projects, UCR development calls for a more locality-oriented approach: extracting potential seeds from the local viewpoint and integrating them into a regional growth system. In this regard, development management system should be structured in such a way that the local authorities' and local private sectors' roles and responsibilities will effectively be combined within a flexible framework. Particularly, strengthening of the local authorities' administrative and financial capabilities would be a critical issue. In this sense, the present centralized system of budgeting and planning may be decentralized to a considerable extent with the following aims:

- To strengthen planning capability and power of the local authorities, and establish a multi-level administrative system for planning to ensure policy consistency policies from the top (the national plan) to the bottom (the local plans),
- To organize inter-city or inter-regional coordination systems at the local level in order to more effectively utilize limited financial and manpower resources,
- To seek measures to strengthen the local authorities' financial base, and expand their revenue sources, and
- To strengthen enforcement and management capabilities of the local authorities especially for environmental management.

The above issues are all discussed in Sector Report Vol. 2, "Urban Management" in depth.

