

The Corridor 21 Development

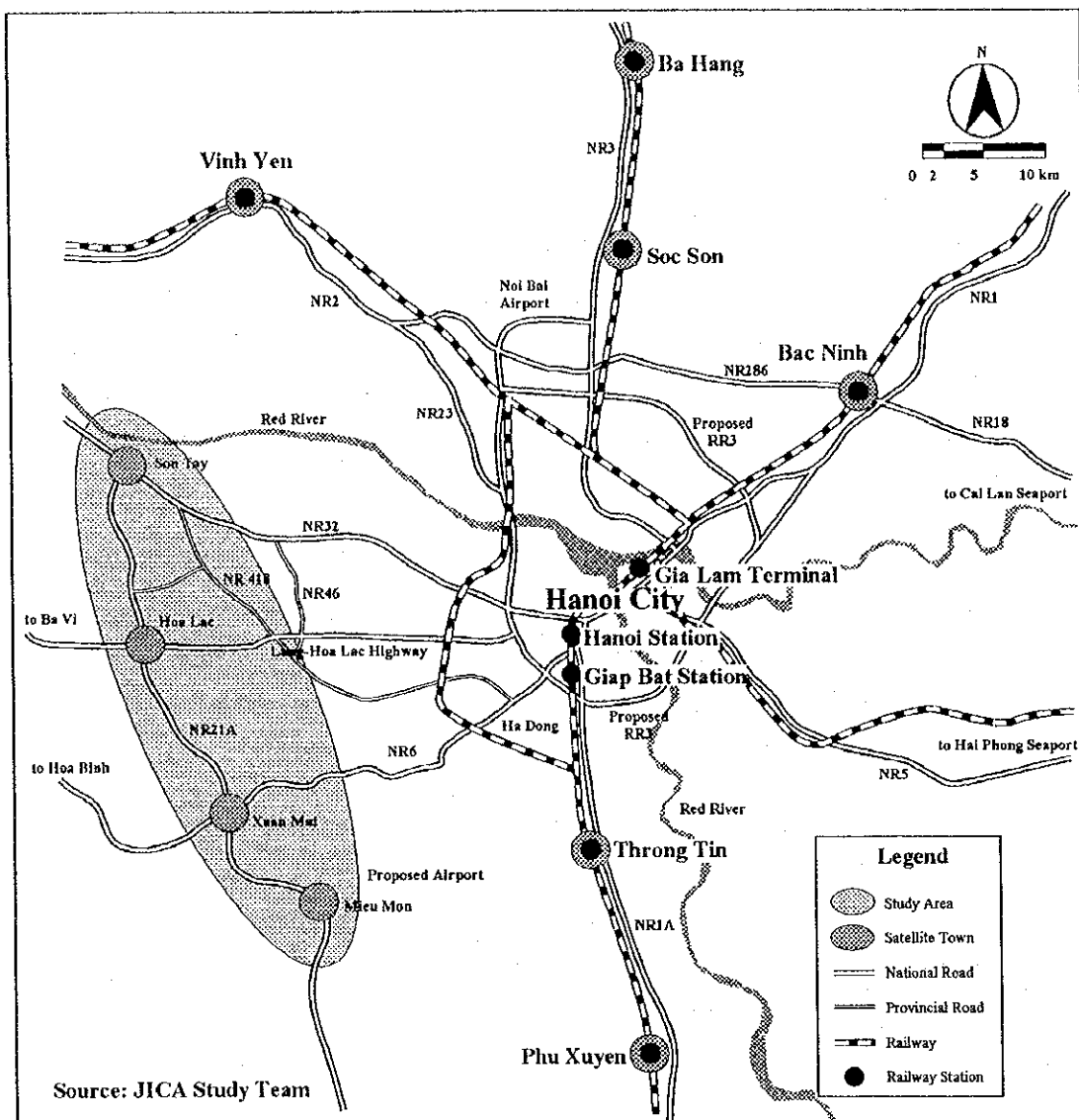


Figure 2.8.2 Existing Railway Network in Hanoi Region

2.8.4 Air Transport

(1) Management

Air transport is managed by Civil Aviation Administration (CAA) of Vietnam. The CAA is an independent organization under the Prime Minister, and not under MOT.

(2) Existing Condition

There are three airports in Hanoi Area: Noi Bai International Airport, Gia Lam Airport and Hoa Lac Airport.

Noi Bai International Airport is located about 23 km northwest of Hanoi. The Airport has played a significant role as a regional hub of air transport in Vietnam for both international and domestic services. The major facilities of the Airport encompass a runway of 3,200x45 m and 1,000 m² storage area. Currently, the expansion of facilities including an additional runway, terminal buildings and other facilities improvement has been proceeded to accommodate one million passengers in the year 2000. The Gia Lam Airport is located 5 km east of Hanoi and handles military and domestic cargo transport. In addition, Hoa Lac Airport, located about 35 km to the west of Hanoi, is used for military purpose, at present.

(3) Mieu Mon New International Airport Plan

The establishment of the Mieu Mon airport is proposed as a second international airport in HMA adjacent to the Mieu Mon district in the Study Area. However, the implementation of the plan is considered as a long-term project, until such time when the capacity of the Noi Bai International Airport becomes full.

2.8.5 Inland Waterway

(1) Management

Inland Waterways Bureau with 10 relevant departments under MOT is responsible for the administration of inland waterway transport in Vietnam. The Bureau has five-river transport companies, 13 river management companies, five design and information companies, factories and training centers.

(2) Existing Condition

Inland waterway in the northern part of Vietnam has been a significant transport mode for a long period. The major river route is the Red River that runs northwest and southeast of HMA, penetrating into Central Hanoi. Nevertheless, the inland waterways transport has not been efficiently utilized due to the increasing dependence on road transport mode.

The existing inland waterway facilities are so obsolete and poorly maintained. In addition, existing barges and tug boats for waterway are old. At present, the waterways are mainly

The Corridor 21 Development

used for distribution of bulk cargoes such as coal, oil, cement, limestone and construction materials rather than passenger transport purpose.

The current main river transport routes in Northern Vietnam are:

- Quang Ninh Province / Hai Phong-Hanoi - Viet Tri
- Quang Ninh Province / Hai Phong-Hanoi / Nam Dinh / Ninh Binh area

The major river routes near the Study Area are Da River, about 20 km away from the Hoa Lac in the west, and Hanoi-Viet Tri route through Red River. Furthermore, the Day River, which diverges from the Red River and runs toward Day Mouth to the south in Ninh Binh Province, can be possibly developed as a river transport route for the Study Area in the future.

The waterway transport has a great advantage as an efficient transport mode for heavy and bulky cargo distribution because the waterway mode can alleviate the road traffic volume as well as the land maintenance construction costs. Nevertheless, the waterways transport mode is not efficiently utilized as a daily transport mode. Furthermore, the facilities of river ports are in a poor condition mainly due to the lack of proper maintenance.

In order to strengthen overall transport network, each transport mode should be integrated with other modes for the optimum use of transport system.

2.8.6 Sea Transport

(1) Management

The Vietnam Maritime Bureau (Vinamari) under MOT is responsible for the management and maintenance of seaports in Vietnam. Vinamari mainly manages seven seaports throughout the nation under 17 port authorities. In addition, Vinamari has organizations such as a search and rescue center, maritime and technical training schools and several companies relating with ocean development.

(2) Existing Condition

Hai Phong Seaport is the major seaport in Northern Vietnam. The cargo handling capacity of the Hai Phong Seaport is about 5 million tons/year at present. In order to meet the future cargo traffic demand, the future expansion plan has been proposed for the seaport. The plan includes a new seaport construction project in an island east of Hai Phong Seaport. The access road to the proposed seaport in the island is to be completed

by 1999, with a length of 7 km including a bridge construction. In addition, the construction of Cai Lan Seaport has commenced in early 1998 and will be completed by 2001. Furthermore, a new construction project of the Cam Pha Seaport is planned in the east of Ha Long.

2.9 Water Supply Sector

2.9.1 Present public Water Supply in Son Tay Area

In Son Tay Urban Area, there is an existing public water system that is managed and operated by the Son Tay Water Supply Company which has 60 staffs. The present water source is groundwater being locally available. The system first commenced in 1962 with one deep well groundwater. The system extension work was done in 1972-73; then water was being supplied to the town center with a capacity of 1,500 m³/d taken from two deep wells.

As the area developed and water demand increased, further extension work was carried out during years 1983-91, and 1994. Presently, in 1998, supply capacity is 10,000 m³/d with 7 deep wells and a treatment plant. The deep wells (depth from 32-35 meters) are located in parallel with the right bank of the Red River. Since the groundwater taken from the deep wells contains higher concentration of iron (Fe) and manganese (Mn) than drinking water standards, the raw water is purified at a treatment plant (5,000 m³/d of old type plus another 5,000 m³/d of new type, making 10,000 m³/d in total). Water treatment follows this process for removal of iron and manganese: aeration --> sedimentation --> filtration --> chlorination. The treated water is distributed to consumers directly by distribution pumps installed in the treatment plant located in the town proper.

The population of Son Tay is presently about 95,000, of which 30,000 people are supplied through 4,000 connections with the public piped water. The average water tariff is 1,400 VND/m³ as of March 1998. In the year 2010, the population is estimated to be 150,000.

For the future, an extension program is currently underway. Its outline is given below.

| | |
|---------------------|------------------------------------|
| Target year: | 2010 |
| Population in 2010: | 150,000 people |
| Water source: | Groundwater (same as the existing) |

The Corridor 21 Development

Additional extension capacity: 20,000 m³/day (making 30,000 m³/day in total, including the existing capacity of 10,000 m³/day)

New facilities: 13 deep wells and a new treatment plant

Possible finance source: DANIDA

(Note: For Son Tay Urban Area, it will not be necessary that drinking water be transferred from Hoa Lac Urban Area, even in future, because the groundwater is locally available as water source for the Son Tay Urban Area.)

2.9.2 Issue of the Development

In Hoa Lac Area, unfortunately groundwater as water source for public water supply system is scarcely available due to geological characteristics, although it can be used for private use with limited quantity. Therefore, water source is to be found in other areas than Hoa Lac. Fortunately, there exists the Da River in the vicinity of the development area. The Da River, a tributary of the Red River, is flowing in south-north direction about 20 km west of Hoa Lac. It has enough amount of water flow and its water quality is suitable as water source, although it requires treatment for drinking purpose. The public water supply system for the Hoa Lac and Xuan Mai Area shall be planned taking the Da River surface water as water source.

2.10 Electricity Sector

2.10.1 Power Supply

The power for four areas of Son Tay, Hoa Lac, Xuan Mai and Mieu Mon is supplied from the national network at each town as follows:

(1) Son Tay and Hoa Lac Areas

The power for these areas is supplied from the Son Tay 110/35/10 kV substation with the capacity of 2~16 MVA.

The power of the Son Tay substation is distributed through the seven 35 kV distribution lines and the thirteen 10 kV distribution lines.

The 35 kV lines supply the power to the factories in Son Tay and Hoa Lac and other areas. The 10 kV lines supply the power to the consumers in Son Tay and Hoa Lac airport. The

consumers in Hoa Lac and farm are to receive electric power from the 10 kV distribution lines of the Hoa Lac 35/10 kV substation, which is located at Hoa Lac near NR21A.

(2) Xuan Mai and Mieu Mon Areas

The power for Xuan Mai area is supplied from the Ha Dong substation by the 35 kV distribution line.

The consumers in Xuan Mai and Mieu Mon towns receive electric power from the 10 kV distribution lines of the Xuan Mai 35/10 kV substation, which is located at Xuan Mai.

2.10.2 Transmission and Distribution Lines

(1) 220 kV Transmission Lines

Three 220 kV transmission lines run across the North of Xuan Mai town to transmit power from Hoa Binh Hydropower Plant to Ha Dong and Chem 220 kV substations.

(2) 35kV Distribution Line

The 35 kV distribution line (ACSR 95 mm²) between Son Tay and Hoa Lac has been constructed to transmit power to the Hoa Lac 35/10 kV substation with the capacity of 2 x 1,800 kVA.

The 35 kV distribution line (ACSR 95 mm²) starts from Ha Dong substation, running along NR6 through Xuan Mai to Luong Son and Hoa Binh.

(3) 10 kV Distribution Line

The medium voltage distribution line in Son Tay, Hoa Lac, Xuan Mai and Mieu Mon is 10 kV and its cable size is ACSR 70 mm².

(4) 0.4 kV Line

The 0.4 kV line is an exposed cable, using aluminum conductor 50 mm²-95mm².

2.10.3 Comment on the Present Condition

Two 220/110 kV substations and two 220 kV transmission lines in order to develop the large urban development at the Hoa Lac and Xuan Mai are essentially required to be newly constructed for power supply to the big IZs, modern urban area and so on. Hoa Binh

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Hydropower Plant, which is located 35 km south-west of the projected area, has enough capacity to supply power to the Hoa Lac and Xuan Mai.

2.11 Telecommunication Sector

2.11.1 Present Telecommunication Services

Public telecommunications network in Vietnam consists of the national telecommunications trunk (inter-provincial, international change, transmission system) system and a 2-end equipment system.

Public telecommunications network is organized and developed according to plans, and managed according to technical norms, standards, consistent operational regulations promulgated by authorized state organs, or allowed to apply following the provision of telecommunications services for the society.

The State unifies the organization and management of the national telecommunications trunk system.

Telecommunications services consist of the following:

- | | |
|----------------------|-------------------------------------|
| a) telephone | h) electronic transmission |
| b) telegraph | i) multi-media |
| c) telex | j) mobile phone |
| d) facsimile | k) answering phone |
| e) data transmission | l) internet |
| f) channel rent | m) information filing and provision |
| g) television | |

The General Department of Post and telecommunication (GDPT) promulgates the rules and regulations on telecommunications.

Specialized telecommunications network is established by an organization, office, or enterprise and used as a means of communications in the forms of dialogue or non-dialogue within the organization, office, or enterprise.

The connection of specialized telecommunications network to public telecommunications network is required to ensure:

- (a) the technical standards of network and equipment suitable with public telecommunications network, and
- (b) the conformity to regulations with the connection and operation of networks.

Vietnamese or foreign organizations, and other individuals in Vietnam who wish to install, utilize, store radio broadcasting equipment within Vietnam territory, and to use the radio frequency of certain fixed, mobile, broadcasting, television, airline, naval, satellite, and other professional fields should apply for a license with the GDPT.

2.11.2 Problems being encountered in the Area

(1) Service Provision

On review of the present condition of telecommunications services in Vietnam, the essential matters are availability and volume capacity. In Vietnam, the basic telephone services such as fixed telephone, telex, and telegraph services are available. On the other hand, value added services such as ISDN-based services will not be provided. In addition, demand fulfillment will be an issue for the telecommunications sector. Although a C/P for telecommunications in Son Tay, Hoa Lac, Xuan Mai and Mieu Mon shall be in line with the M/P of telecommunications in the whole country, the JICA Study Team could not get the specific plan formulated for the Study Area.

(2) Service Quality

Service quality is characterized by i) low call completion rate, ii) many and frequent faults in operation, and iii) delay of fault clearance work. The call completion rate is a percentage of call attempts that receive an answer. The percentage of call completion will be relatively low in Vietnam. The fault rate indicates the number of faults per month per 100 main lines. In Vietnam, the fault rate will be many and frequent. The clearance time is one of the major quality indicators concerning the maintenance efficiency. The figure can be shown by percentage as fault clear rate within 24 hours. In Vietnam, the rate will be relatively low.

The Corridor 21 Development

(3) Demand Fulfillment

Although the present telephone demand and supply capacity in whole Vietnam are not clear, it is expected that a large gap will exist between the number of direct exchange lines (DEL's) and new line applications.

2.12 Agriculture Sector

2.12.1 Agriculture in the Red River Delta

The significance of the agriculture sector in the regional economy decreases year by year because the non-agriculture sectors, such as service sector and the industrial sector, expand more than the agriculture sector. The economic growth rate of agriculture between 1995 and 1996 was only one percent, while during that period, the whole economy grew at 9.3 %. In 1996, the share of the agriculture in the total economy was 28.9 %. Per-capita annual income in 1996 was US\$ 238 expressed in 1994 prices.

The major economic indices of agriculture in the Red River Delta (RRD) are shown in Appendix (Vol.-4) of this Report.

2.12.2 Agricultural Conditions in the Planned Areas

(1) Hoa Lac Urban Area

In this area, farmland, such as paddy fields and upland areas, occupies 63 % of the total planned area of 8,510 ha, of which paddy fields is 1,690 ha and upland area is 3,590 ha. Besides farmland, there are 940 ha of artificial forest consisting of eucalyptus and acacia covering 11 % of the total area. Residential area occupies only 9.6 % of the total area. The Hoa Lac area can be said to be the agricultural rural area with plenty of green fields.

In most of the paddy fields, two cropping of paddy cultivation, i.e. winter-spring paddy and wet season paddy, are practiced. Unit yields of paddy are 4 to 4.6 tons/ha for the winter-spring paddy and 3 to 3.9 tons/ha for the wet season paddy. In the uplands, cassava, sweet potatoes, groundnuts, maize, beans, sugar cane and vegetables are grown. In the state farm, pineapple and lychee are grown.

The Corridor 21 Development

Animal raising is the second most important source of income after crop production for farmers. Cattle and buffaloes are kept for draught work. Pigs and poultry are raised for meat or eggs. Animal husbandry is in small-scale and is done in backyards.

According to the report on environmental impact of the Xuan Mai-Hoa Lac Urban Development, 92 % of the local people are engaged in agricultural production. The average per capita GRDP per year in 1997 was 1.2 to 1.3 million Dong, of which 50 % to 60 % were from agriculture and forestry, 25 % to 35 % from animal husbandry and 13 % to 15 % from handicraft and services, according to the preliminary study report on the direct socio-economic impact of the Hoa Lac High-Tech Park Development. The average family size is 3 to 4 persons.

(2) Xuan Mai Urban Area

Compared to Hoa Lac, Xuan Mai Urban Area is more urbanized with a residential area of 18 % out of its total area of 3,110 ha. Paddy fields cover 12.6 %, and upland area has a share of 47.9 % of the total area. It is noteworthy that tea plantation has an area of 320 ha corresponding to 10.3 % of the total area. Unit yields of paddy are 4.4 tons/ha for the winter-spring paddy and 3.2 tons/ha for the wet season paddy. Other agricultural conditions appear to be the same as the Hoa Lac.

(3) Son Tay Urban Area

The Son Tay Urban Area is much urbanized than other planned areas. According to the M/P of urban areas of Mieu Mon-Xuan Mai-Hoa Lac-Son Tay by the MOC, within the total area of 920 ha, residential area is 318 ha, which is equivalent to 34.6 % of the total area. Agricultural land occupies only 25 %, while army area covers as much as 20.3 % of the total area. Unit yields of paddy are 4.0 tons/ha for the winter-spring paddy and 3.9 tons/ha for the wet season paddy. Other agricultural conditions appear to be the same as the Hoa Lac.

(4) Mieu Mon Urban Area

The Mieu Mon Urban Area also is a rural area. The MOC's M/P shows that the agricultural area of Mieu Mon is 800 ha corresponding to 48.5 % of the total area. Agricultural conditions of the area appear to be the same as the Xuan Mai area.

The Corridor 21 Development

2.12.3 Contamination Issues for Development

Waterborne and excreta-related diseases are among the main causes of morbidity and mortality of children according to the Country Health Information Profile prepared by the World Health Organization (WHO) in 1993. About 70 % of these cases occur in children under five and about 30 % of all reported deaths of children in this age group are associated with diarrhea. Parasitism is the most endemic disease in the Study Area. About 90 % of the population are infested with one or more types of intestinal worms.

The high incidence of this disease is directly connected with the practice of applying raw night soil to crops. Low sanitary awareness, the absence of septic tanks and the domestic wastewater treatment facilities are the main causes.

In Son Tay town, there are about 3,056 latrines, in which septic tanks are 460, self-soaking latrines are 90, double vault latrines are 154 and others such as bucket latrines and pit latrines are 2,352. Only 15 % of toilets are considered hygienic. The main part of sewage is discharged freely without treatment to underground and the remaining, to ponds, rivers, streams and crops.

In Hoa Lac, almost all toilets are septic tanks or double vault latrines. Sewage disposal is the same as Son Tay's.

In Xuan Mai townlet, only business households have septic tanks. Other households have double vault latrines and bucket latrines. Sewage disposal is the same as Son Tay's.

In Mieu Mon, no urban place is formed. Most of the toilets are bucket latrines or pit latrines. Sewage disposal is the same as Son Tay's.

In rural areas with high groundwater levels, double vault latrines are the most commonly used. Pit latrines are sometimes used in hilly areas at high elevations. Bucket latrines and fishpond latrines are also used. The waste material is used as fertilizer for crops. Contamination of shallow groundwater aquifers occurs in some areas.

In addition, other problems are caused by the discharge of excess human waste to farmland. The natural process of decomposition and absorption causes chemical and physical deterioration of soil properties, and consequently, in farmers' working conditions. Too much enrichment of soil raises nutritional disorders in crops resulting in low yields. Foul smell caused by human waste deters farmer from working in farm fields. Contamination of food by the foul smell causes marketing problems, too. These problems have been experienced widely in Japan's

urban agriculture. According to the Japanese experience, early and prompt measures against these problems are badly needed to effectively conserve good agricultural environment. However, the restoration of sound agricultural environment would need substantial money and time.

2.12.4 Protection of Agricultural Land and Environment

Effective land management is indispensable for the conservation of agricultural land. However, there is no effective land management system in Vietnam. In urban areas, as much as 80% of all transactions and small-scale building construction are taking place outside of the formal government structure. Rice land on the fringe of urban areas continues to be converted to non-agricultural uses without formal approval of the Prime Minister. Areas on the fringe of the built-up area of most urban centers, which appear as green areas on the colorful city M/P, continue to be developed as new residential areas, often for government officials. There are several reasons for the above problems, to wit:

- (a) Land use rights certificates cannot be issued because sufficient cadastral mapping and surveys do not exist,
- (b) Land valuation based on market mechanism does not exist;
- (c) There are no sufficiently trained staff as well as latest techniques and equipment to carry out government mandates in the areas of urban planning, cadastral surveying, mapping, land evaluation and database management; and
- (d) There are overlapping and unclear lines of responsibility for urban land at both the central and local government levels.

2.12.5 Agricultural Policies

(1) Agricultural Policies in Hanoi

Development policies of the province are directed to industry and service sectors due to the limitation of land resources and high population pressure in the province.

According to the 2010 development plan of the Ha Tay Province, GRDP of the province will be VND 107 trillion for the year 2010 and the per-capita GRDP will be US\$ 3,037. Average growth rate will be 16 % per year.

The Corridor 21 Development

The non-agriculture sector will dominate the economy as shown in the table below. Agriculture will occupy only 14 % of the GRDP in 2010 as compared with 43 % in 1993 (see Table 2.12.1). The agricultural growth rates will be 3 % from 1995 to 2000 and 3.5 % from 2001 to 2010.

Table 2.12.1 Composition of GRDP (%)

| Sectors | 1993 | 2000 | 2010 |
|-------------|------|------|------|
| Industry | 19 | 23 | 29 |
| Agriculture | 43 | 31 | 14 |
| Service | 38 | 46 | 57 |
| Total | 100 | 100 | 100 |

Agriculture policies are oriented to cash crops and livestock, and the production of cereal crops will drop to 36 % in 2010 from 58 % in 1994 as shown in the next Table 2.12.2. The provincial government is promoting flower trees and bonsai for sale to urban population and for export, and wants to establish nursery or seedling centers for fruit trees, quality vegetables, flowers and bonsai.

Table 2.12.2 Composition of Agricultural GRDP (%)

| Description | 1994 | 2000 | 2010 |
|-------------------|------|------|------|
| Cereal crops | 47 | 35 | 19 |
| Vegetables | 5 | 7 | 8 |
| Fruit trees | 3 | 3 | 5 |
| Industrial crops | 3 | 4 | 4 |
| Animal production | 42 | 51 | 64 |
| Total | 100 | 100 | 100 |

The decrease of agricultural land by the urbanization is one of the most important problems for sustainable food supply in the RRD. The Ha Tay Province plans to preserve agricultural land by confining 80 % of the population in urban areas in 2010 from 52 % in 1994.

(2) Agricultural policies of the Ha Tay Province

According to the 1996 statistical yearbook of Ha Tay, GRDP of province in 1996 was VND 3.8 trillion at 1994 prices, with a per-capita GRDP of VND 1.64 million. The composition of GRDP was:

- (a) Agriculture/forestry: 45 %
- (b) Fisheries: 2 %
- (c) Processing industries: 18 %

The Corridor 21 Development

| | |
|---------------------------------------|------|
| (d) Manufacturing/power/water supply: | 1 % |
| (e) Construction: | 7 % |
| (f) Services: | 27 % |

The main economic sector is the agriculture sector sharing 45% of GRDP.

The direction of agricultural production of Ha Tay Province will be the improvement in productivity by attaining an output of over US\$ 2,000 year/ha for crops and high yield per cattle, poultry, together with promotion of winter crops, the full exploitation of deforested mountains and hills for agriculture and, at the same time, sustaining an environment-friendly agriculture.

2.12.6 Issues of Delta's Agriculture in Connection with the Urban Planning in the Future

The high population pressure under the limited land resources in the RRD and the poverty in the rural areas will inevitably cause population concentration in the cities such as Hanoi, because people want to go where jobs are available. Cities are thought to have jobs. Urbanization is progressing in the Delta as shown by the fact that the agricultural land decreases by 14,700 ha/year.

The Corridor 21 Development will accelerate urbanization in the rural, which will result in several issues such as the decrease of agricultural land, the increase of slums, the deterioration in air/water pollution problems, noise and the destruction of scenery, and so on. Therefore, the preservation of agricultural land for sustaining food security, for sustaining a sound environment for the urban population and for the creation of job opportunities will be the main issues.

2.12.7 Urban Agriculture Development Project

Urban agriculture was highlighted in the second UNDP conference on human settlement as an effective measure to lesson poverty, to improve the health and nutrition of the town dwellers, to ensure food security and to conserve the environment.

Urban agriculture includes growing crops in green houses, on backyards, community space and surplus or reserve public/private space, raising livestock in backyards and cultivating fish in ponds, stream and lagoons. The urban poor spend as much as 90 % of their income on food. For those people, urban agriculture offers an opportunity for a better diet, and for more income

The Corridor 21 Development

to spend for other needs such as health care and housing. For middle class people, urban agriculture offers the possibility for savings and investment in urban property.

Public intervention in the development of urban agriculture shall include the following:

- (a) Research/Extension: land use planning, sewerage reuse planning, inventory surveys, technical services, researches, model creation,
- (b) Financial support: credit services and subsidies, and
- (c) Marketing services: information, health standards.

CHAPTER 3

CONCEPT FOR THE CORRIDOR 21 DEVELOPMENT





CHAPTER 3 Development Concept for the Corridor 21 Development

3.1 Justification of the Corridor 21 Development

3.1.1 Future Growth of the Hanoi Metropolitan Area (HMA)

Over the past decade, the developing world has faced constant urban population growth associated with its industrialization process. Table 3.1.1 shows the rates of urban population in Asian countries.

Table 3.1.1 Urban Population in Asian Countries

| Country | Population (millions) | Population Growth (%) | Urban Population (%) | Population of Capital (mil) |
|-------------|-----------------------|-----------------------|----------------------|-----------------------------|
| Japan | 126.1 | 0.3 | 78 | *11.8 (1996) |
| China | 1,239.5 | 1.2 | 30 | 7.4 (1990) |
| Singapore | 3.1 | 2.0 | 100 | *3.0 (1995) |
| Indonesia | 201.6 | 1.6 | 34 | 9.1 (1995) |
| Malaysia | 21.9 | 2.4 | 47 | 1.1 (1991) |
| Philippines | 72.6 | 2.3 | 46 | *8.6 (1994) |
| Vietnam | 72.8 | 2.3 | 21 | *3.1 (1992) |
| Thailand | 61.4 | 1.5 | 36 | *5.9 (1990) |

Source: Asiaweek August 7, 1998 and Sekai Kokusei Zue

Note*: Figures include the suburban population

The above table indicates the possibility that the Vietnamese high-level population growth with its relatively low-level urban concentration would result in the accelerated increase of urban population in the 21st century as other Asian countries have been experiencing.

Also, the Asian countries are facing serious urban problems caused by the accelerated increase of urban population particularly in their capital cities. Extreme traffic congestion resulting in air pollution, inadequate waste management systems resulting in sanitary and hygienic problems, illegal settlement of migrated people resulting in squatters, and so on, are by and large commonly seen in the capital cities. In order to cope with the aggravating urban environment, urban planning and development should be pursued in a proactive manner before it goes to an unmanageable level.

As a matter of fact, by the year 2020, urban population of Hanoi Metropolitan Area (HMA) is expected to increase up to 4.5 million, and the central area may reasonably accommodate about 2.5 million and the rest need to be accommodated outside the Hanoi central area. Therefore, in order to avoid extreme concentration of population and resultant urban problems in the future

The Corridor 21 Development

HMA, accommodation of the probable spillover population is of the important justification of the Corridor 21 Development.

Based on the information obtained from the MOC and the Hanoi People' Committee, the future Hanoi Metropolitan Structure vis-à-vis the Corridor 21 Development is roughly depicted as shown in Figure 3.1.1.

- The central area surrounded by Ring Road 3 and divided by the Red River remains as high-populated urbanized areas with the predominant service sector functions in the south of the River and the mixed service-and-productive functions in the north of the River,
- Outside the Ring Road 3, rich paddy and farm land spreads over and the area will likely remain as the productive farm land by limiting the land-use change over the future, and
- Outside the farm land, the areas not suitable for farming, will be used for residential and other urban functions such as the Corridor 21 Development.

In short, the Future Hanoi Metropolitan Structure is depicted as having the central area with two cores each locating the north and the south of the Red River, surrounded by the wealth of the farm land, outside which are a multitude of satellite cities sharing various urban functions and absorbing spill-over population of the central area.

The Corridor 21 Development is characterized as one of the satellite cities which are, as a prerequisite requirement for their existence in the long run, to be linked to the central area with mass transport systems to ensure the mobility of the people, thus sharing various urban functions in a complementary manner.

3.1.2 Human Resource Development

Admittedly, Vietnam faces formidable social and economic development challenges towards the 21st century, in order to properly cope with the changing worldwide circumstances. Such changes may be construed in many ways but one of the predominant changes is so-called "economic liberalization and globalization" which would naturally bring about fiercely competitive market situations on a global basis.

Apart from the development challenges, in order to distribute more equitable development effects over the Country, Vietnam should also face serious challenges to alleviate growing regional economic disparities typically seen between the North and the South.

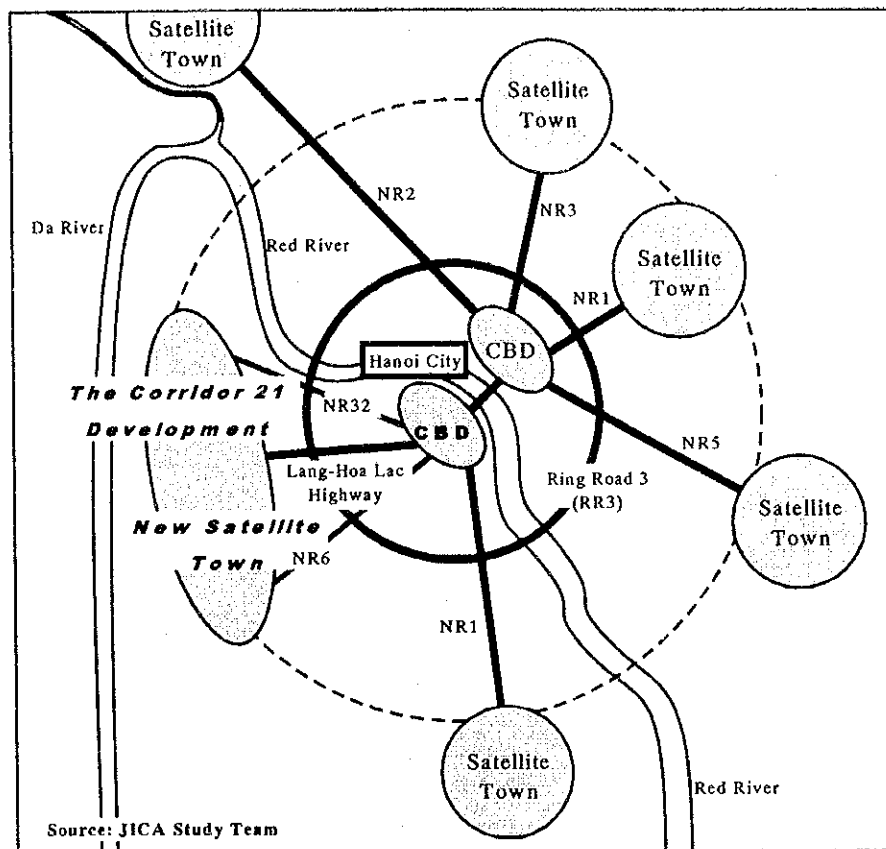


Figure 3.1.1 Future Hanoi Metropolitan Structure

Taking these challenges into consideration, urban planning of the Hanoi Metropolitan Area (HMA) should place important emphasis on the urban economic development as the center of the integrated economy of the Country as well as the economic center of the North Vietnam. In this context, improvement and/or development of the urban economic functions of HMA is very much important when considering its urban planning in the future.

Facing fiercely competitive market situations in the liberalized world economy in the 21st century, Vietnam should prepare itself to properly cope with the situations. There might be different options and scenarios to be pursued by Vietnam, but whatever be selected, one of the most fundamental requirements is to develop the quality human resources which should be the basis for enhancement of more value-added production of the country as a whole. Also, advancing high-tech and high-order services is obviously one of the preferred options and scenarios along this line, which will enable Vietnam to be more competitive in the world market.

The Corridor 21 Development

As the integrated economic center of the country, Hanoi should play the central roles to evolve the high-tech and high-order services, taking full advantage of the quality human resources, so that Vietnam can differentiate its competitiveness in the world market.

The point mentioned heretofore might be a bit qualitative discussion but constitute the important justification of the Development from the macro-economic and industrial policy aspects. That is, to create the national center of developing the quality human resources as well as advancing the high-tech and high-order services in the Corridor 21 Development as the catalyst to create future rippling effects over the country. This objective can be more effectively achieved by establishing the triad linkages among universities, enterprises, and public/private research & development (R&D) institutes in the Corridor 21 Development.

3.1.3 Development and Promotion of Science and Technology

One of the most crucial issues causing the economic crisis cloudily gripping the East Asia is the weak industrial structure without having their own technology overly dependent upon imported technologies and capital products, thus failing in value-added production.

Heightening the industrial structure is nothing but to pay continual efforts to nurture the domestic technologies supported by the industrial policies to promote indigenous science and technology (LS&T) and HRD, as well as to nurture the bolstering small-and medium-scale industries. In this context, efforts need to be made to internalize imported technologies by means of enhancing R&D functions.

When considering the first phase development of HHTP, priority considerations should be given to the point as to how attractive investment circumstances can be created in HHTP to induce subsequent flows of both foreign direct investment (FDI) and domestic investments. Needless to say, provision of adequate "hard infrastructure" is of the mandatory requirement, but provision of attractive "soft infrastructure" such as quality human resources and supporting R&D functions is no less important than the hard infrastructure.

In this context, priority considerations should be given to the development of introducing the HRD and R&D functions in HHTP.

3.1.4 Concept of Eco-City

The Corridor 21 Development aims to create a "Garden City" or "Eco-City" where urban amenity and life, natural environment can coexist. This concept can be expressed in other

word, namely a “Environment-Friendly City” or “Environment-Harmonized City”. In natural eco-system, efficient interactive circulation and exchange of energy and materials with each ecological element make it sustain and stabilize. In order to establish a sound and comfortable urban environment, it is indispensable to develop an urban structure characterized by its diversity, self-supporting, stabilization and circulation that is a feature of natural eco-system above mentioned. Namely, in order to establish a favorable urban environment in the social environment system, actions which promote a function of eco-system such as controlling the quality and quantity of urban activity, elimination and control of pollutants at the sources, efficient use of energy and resources, practice of resource recovery from waste and so on, are required. This also means a formation of urban system similar to an “Eco-Cycling City”, which is functioning within natural eco-system. Furthermore, policies for building Eco-city should incorporate both public and private opinion.

OECD report states the ecological city that;

“An ecological city is distinguished by the degree to which environmental considerations are incorporated into decision-making in public and private sectors alike. An ecological city is simply more effective at finding and implementing solutions to environmental problems. In an ecological city, people should be conscious of their local and global responsibilities for the environment, environmental problems would be addressed continually, environmental considerations would be integral to a wide range of policies and sectoral activities, and greater attention would be given to providing a better quality of life for all urban citizens. The object must be to integrate social, economic and environmental objectives to achieve sustainable development.” (*Innovative Policies for Sustainable Urban Development, The Ecological City*. OECD, 1996)

Building the Eco-city means building an urban that is inherently adaptable, characterized by diversity, variety, self-supporting and sustainability in both natural and built environments. The following are principal concepts, which should be included for the formation of Eco-cycling urban system or Eco-city.

- To make an environmental conservation plan from the standpoints of Eco-cycling and sustainable urban development.
- To use energy and materials efficiently which are basic elements for supporting urban activities. For this purpose, it should be promoted to establish a structurally Eco-cycling city by introducing and completing the ecosystem, which include 5 functions as follows, i) the improvement of efficiency of the use of energy and materials, ii) utilization of natural energy, rain water, sewage and other treated waters,

The Corridor 21 Development

and waste heat, iii) reduction of wastes, iv) resource recovery from wastes, v) re-use of circulated water in business offices and residential areas, etc.

- To positively re-create nature in urban area by conserving and completing the biological habitat, and to positively conserve nature remained in urban area by increasing greenery area and other measures as well.
- To positively participate in variety of environmental conservation activities toward improving the urban environment for urban people and companies in order for sustainable development. Enhanced public awareness, consultation, and participation can improve environmental management.
- To grapple with the problems toward the promotion of Eco-cycling town from the comprehensive and predictive standpoints with a large number of participants of citizen and companies.
- To install/construct the appropriate environmental infrastructure such as sewage, solid waste treatment facilities to cope with the problems concerning the environmental issues.

3.2 Development Goals and Objective

3.2.1 Development Goals

The principal goals of the Corridor 21 Development are summarized as follows:

(1) To become the national center for HRD and the development of S&T

The Prime Minister's decision on the approval on the C/P of the Vietnam National University (VNU) issued on January 26, 1998, outlined the policies as follows:

VNU is a center for education, training, and scientific research of multiple sectors, as well as inter-sector operational linkage among universities, research institutes, and experimental units, ensuring the integration of training and scientific research, and technology transfer. Also, VNU is a cultural center assuming the roles of solidifying science and cultural interchange in Vietnam's higher education.

According to the policies, VNU is expected to provide the functions of i) education, research and other related activities, and ii) science and cultural interchange in the higher education in Vietnam. Along this line, VNU is expected to grow as a comprehensive university that can cover a wide range of research fields as well as higher education and

training activities, which necessitates for VNU to augment additional professional study courses in the fundamental fields. In relation with the science and cultural interchange, VNU is expected to assume a central function to network the information among academic institutes as well as between academic institutes and industrial sector, and promote higher education among the nation through broadcast education, correspondence, social education, and so on.

(2) To assume the lead for nurturing a high-tech industry in the country

The Prime Minister approved the Hoa Lac High-Tech Park (HHTP) Development in October 1998, with the following comments on the Development, which represents the policy of the Government.

“Dire experiences of economic crisis seriously gripping other Asian countries indicate that Vietnam should not completely imitate imported technology, as other countries had done to develop their national economy. Vietnam will be able to compete with other nations in the technological fields. Priority consideration should be given to improve HRD, which is already recognized as one of the strengths of Vietnam, while personnel training should go hand in hand with R&D as well as business expansion. Vietnam should become a basically industrialized country over the next 25 years, and technology should be seen as a crucial factor in realizing that goal.”

(3) To share the Hanoi Metropolitan Area urban functions

In addition to the national center function for HRD and development of S&T, the Hoa Lac and Xuan Mai Urban Development should also share the important HMA urban functions. International exchange, and culture and recreation will be the dominant functions to be shared. International exchange will be an inseparable part of the future economic growth, and the demand for culture and recreation will upsurge as per-capita incomes grow and a 5-day working system becomes popular. By sharing such functions, Hoa Lac and Xuan Mai will achieve its diversity, enhance its attractiveness, and strengthen its linkage with Hanoi.

(4) To absorb the increasing HMA urban population

As a matter of fact, by the year 2020, urban population of HMA is forecast to increase up to 4.5 million, and the Central Hanoi area may reasonably accommodate about 2.5 million and the rest need to be accommodated outside the Hanoi central area. Therefore, in order to avoid extreme concentration of population and resultant urban problems in the future

The Corridor 21 Development

HMA, accommodation of the probable spilled-over population is an important justification of the Corridor 21 Development.

As will be later discussed in detail, these goals of the Corridor 21 Development have functional linkages as illustrated in Figure 3.1.2.

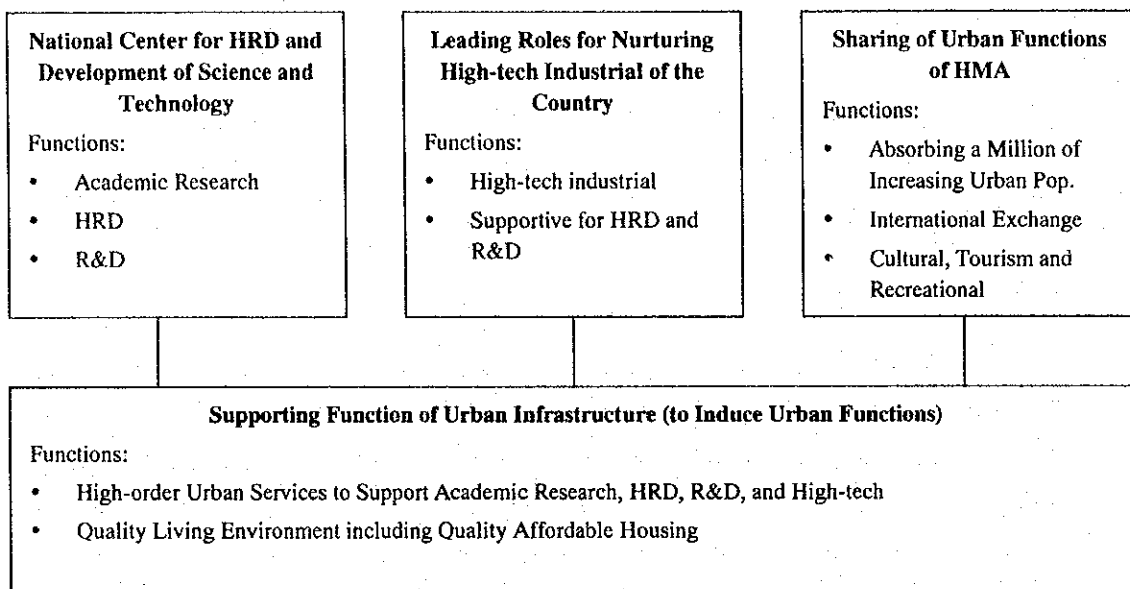


Figure 3.1.2 Composition of the Proposed Urban Functions

3.2.2 Development Objectives

The above goals for the Corridor 21 Development are translated into more precise objectives to be challenged and reasonably achieved through its implementation process.

(1) Designation of the Hoa Lac and Xuan Mai Urban Area as a Special Economic Zone

The Corridor 21 Development, particularly the core development of the Hoa Lac and Xuan Mai Urban Area, is of national importance and significance, and as such, to be regarded as the “**National Project.**” In order for the Project to receive special considerations and incentives from the Government, the concept of a “**Special Economic Zone (SEZ)**” will be proposed to apply to the Project. The SEZ incentives would induce private-sector investments of both domestic and foreign investors, thus expediting the implementation of the Project. Legal and institutional arrangements to effectuate the SEZ concept need to be done in advance. It is preliminarily conceived that the SEZ incentives should wholly cover the investment and economic activities that take place in the designated Zone (Hoa

The Corridor 21 Development

Lac and Xuan Mai Urban Area) but the existing high-tech and IZ incentives should also remain effective. And as such, application of these incentives should be optional with applicants.

(2) VNU Relocation

The Hoa Lac and Xuan Mai Urban Development includes the relocation of the Vietnam National University (VNU) to the Hoa Lac Urban Area. The VNU relocation is to reorganize and integrate its existing affiliated universities into a comprehensive university in the short run, and then integrate non-affiliated universities in the medium to long run. The VNU relocation is expected to respond to the increasing need for higher education as well as the development of science and technology (S&T) in the country. In reorganizing and integrating, priority consideration will be given to strengthening the fields of S&T, aiming at establishing a triad linkage among universities, enterprises, and public/private research and development (R&D) institutes.

(3) HHTP Development

The Hoa Lac and Xuan Mai Urban Development also includes the Hoa Lac High-Tech Park (HHTP) development. The HHTP development is to take a central role of internalizing and advancing the high technology, thus nurturing the high-tech industries in the country. The accomplished results will be diffused over the country to bolster the national efforts to promote S&T in the 21st century.

(4) Share of HMA Urban Functions and Accommodation of HMA Urban Population

In addition to the central functions for HRD and harnessing high-tech industries, the Corridor 21 Development will also share the important HMA urban functions such as cultural exchange and recreation (in the Dong Mo area), international exchange (in the C21 Urban Center Area), and so on. Also, it will partly absorb the sharply increasing HMA urban population in the future, and importantly act as “receptacles” to absorb the resettlement needs resulting from the urban renewal and redevelopment in the Central Hanoi area.

(5) Pioneering Housing Development

The Corridor 21 Development, in general, and the Hoa Lac and Xuan Mai Urban Development, in particular, is a pioneering project in the context of promoting a nationwide housing development in order to improve the aggravating living environment of

The Corridor 21 Development

the people, thus contributing to enhancing the national economy and welfare. New policies and institutions will be introduced to encourage people to own quality homes at affordable prices. Citing as examples are the issuance of a “**Housing Development Bond**,” and the establishment of the “**Housing Development Corporation**.”

(6) **Creation of an Environment-Friendly Garden City**

In order for the Corridor 21 Development to flexibly respond to changes in future, a belt-shaped zone along the NR21A should be designated as an urban development zone, and any development activities outside the zone should be strictly controlled from the environmental conservation aspect. The concept is to create a “**garden city**” where convenient urban life and natural environment can coexist.

(7) **Creation of an Attractive Urban Center**

An attractive and convenient “**C-21 Urban Center**” should be planned and developed from the beginning phase, which should cater not only to the people living in the Hoa Lac Urban Area but also to those living in the Corridor 21 Development or even in neighboring regions. It is rightly presumed that the success in inducing people and investors to come in would be partly dependent on the attractiveness of the urban center created.

(8) **Compact Development Approach**

In order to reduce the development cost for infrastructure, a “**compact development**” approach is always to be pursued particularly for the first phase development of VNU, HHTP, the C-21 Urban Center, as well as Dong Xuan Housing. Such compact development will also present a “unified” impression rather than “piecemeal” appearance, thus alleviating the sense of incompleteness in the development process.

(9) **Land Acquisition and Resettlement Harmonious with Existing Communities**

In order to develop the Hoa Lac and Xuan Mai Urban Area in a cost-effective manner in both economic and social terms, land acquisition and resettlement should be handled using innovative means in order to avoid compensation in cash. Attempts should be made to conserve in principle the existing communities and already urbanized areas, unless they have to be dispersed in a smaller scale, which would contribute to savings in land acquisition cost.

(10) Active Participation of the Local Government

Although the Hoa Lac and Xuan Mai Urban Development is considered as a national project, expectations are high that the Ha Tay Province will have an important role for its implementation as a major stakeholder. The Ha Tay Province would be responsible for land management and administration, as well as for construction, operation and maintenance of various public and community facilities. Should decentralization becomes an issue in the future, local governments would have to build their capability for implementing development projects and programs. In this context, the Corridor 21 Development will be a precious opportunity to enrich their experiences and capacities.

3.3 Functional Roles of Son Tay, Hoa Lac, Xuan Mai and Mieu Mon

3.3.1 Geography

The area of the Corridor 21 Development is located on both sides of NR21A that extends from Son Tay in the north to Mieu Mon in the south. It is bordered in the north by the Red River Delta, in the south by the Tuy Lai Lake (My Duc - Ha Tay), in the east by the Tich River, and in the west by Ba Vi and Vien Nam mountains.

3.3.2 Self-contained Hoa Lac New Town

It may be safely said that the proposed Hoa Lac New Town will have rather self-contained characteristics with its two principal functions of VNU and HHTP, particularly in the early phase of its development. In the later phase, it will share various urban functions of HMA, thus growing as a multi-functional satellite city. In its strict sense, Hoa Lac New Town will be neither self-contained nor a complete dormitory town, but actually having both characteristics. It should be noted that the self-contained characteristics should not imply an "isolated city," rather it should have strong linkages with central Hanoi for support of its economic activities.

3.3.3 Inter-city Linkages

The "primary inter-city linkage" would be formulated between central Hanoi and Hoa Lac New Town, followed by the formulation of the "secondary linkages" between Hoa Lac New Town and the other cities along the NR21A. This implies that development effects rippling over Son Tay, Xuan Mai, and Mieu Mon would be marginal until substantial developments take place in the Hoa Lac Urban Area. However, as far as the construction sector is concerned, a strong

The Corridor 21 Development

linkage between Hoa Lac, Xuan Mai, and Mieu Mon will be built up throughout the Hoa Lac and Xuan Mai Urban Development.

3.3.4 Son Tay

Son Tay is predominantly characterized as the tourist service center along the NR21A due to its endowment of tourism resources such as cultural heritages, resort areas such as Suoi Hai Lake and Dong Mo Lake, and Ba Vi Mountain. Son Tay is conveniently accessible from Hanoi via NR32, Lang-Hoa Lac Highway and NR21A, and the Red River cruise. A cultural village project is planned in the Dong Mo Lake side, where not only Hanoi citizens but also international tourists would visit. Tourism-related services and industries will locate in Son Tay including hotels and restaurants, souvenir shops, cottage industries for handicrafts, and so on.

Son Tay will also be a center for marketing perishable foods such as vegetables, fruits, fishes, and meats, as well as agri-processed products. Associated with the development of Hoa Lac, some educational and R&D functions may spill over Son Tay due to its proximity to Hoa Lac.

Future urban developments of Son Tay will be of the "expansion type" centering around and harmonizing with the existing urban structure and communities.

3.3.5 Xuan Mai

Xuan Mai will be the center for trade and industry as well as physical distribution. Also, with the relocation of some military facilities from Hoa Lac, Xuan Mai will assume important national defense functions. Due to its proximity to Hoa Lac, industrial developments may ripple over Xuan Mai in rather a short period of time. Trade processing industries will be induced to locate in Xuan Mai due to its convenient accessibility to peripheral and inland areas via NR6 and NR21A.

The Hoa Lac and Xuan Mai Urban Development will generate massive construction needs including production of construction materials and equipment. Xuan Mai, associated with Mieu Mon, will be the center of construction industries to support the Urban Development.

With the existence of schools, colleges, and vocational training facilities, Xuan Mai will remain as a regional center for education and training. Future urban developments of Xuan Mai will be of the "expansion type" centering around and harmonizing with the existing urban structure and communities.

3.3.6 Mieu Mon

The M/P prepared by MOC indicates the possibility of developing a new Mieu Mon International Airport within the planning period (2020). If it comes true, enormous development potentials will be created in Mieu Mon such as various passenger services, high-tech industries, off-shore business center, tourism and convention, and so on. Given the little possibility of developing the airport, potential industries will be dominated by construction industries including production of construction materials and equipment like Xuan Mai.

Among the production, pre-cast concrete products for use in various construction purposes are considered to have high potential, taking advantage of the existing pre-cast concrete factories and easily available concrete aggregates from nearby quarries. Although it depends on the future technological development, pre-cast concrete system for housing construction will be in massive need even for the Hoa Lac and Xuan Mai Urban Development.

3.4 Concept for the Human Resource Development

3.4.1 Human Resource Development

(1) Human Resource Development Policy in Vietnam

The target of education and training by MOET is shown in Table 3.4.1. The proportion of engineers / technicians / skilled workers will change from 1 / 1.6 / 3.6 at present, to 1 / 2 / 7.5 in 2010, and 1 / 2.5 / 9 in 2020.

Table 3.4.1 Prediction of Training Structure

| | Unit: % of total labor force | | | |
|---------------|------------------------------|-----------|----------|---------|
| | 2000 | Phase-1A* | Phase-1B | Phase-2 |
| Skilled labor | 15.0 | 23.0 | 30.0 | 45.0 |
| Diploma | 5.0 | 8.0 | 11.0 | 17.5 |
| Certificate | 10.0 | 15.0 | 19.0 | 27.5 |
| Technician | 5.0 | 6.5 | 8.0 | 11.0 |
| Engineer | 3.0 | 3.5 | 4.0 | 5.0 |
| Total | 23.0 | 33.0 | 42.0 | 61.0 |

Source: MOET

Note: *estimated by Study Team

In order to achieve the above target, enrolment at each school level is estimated in Table 3.4.2.

Table 3.4.2 Prediction of Enrolment Ratio in General Education

| | Unit: % | | | |
|------------------------|---------|----------|----------|---------|
| | 2000 | Phase-1A | Phase-1B | Phase-2 |
| Primary school | 95.0 | 97.0 | 98.0 | 100.0 |
| Lower secondary school | 70.0 | 80.0 | 88.0 | 95.0 |
| Upper secondary school | 37.0 | 40.0 | 45.0 | 60.0 |

Source: MOET

The above figures are deemed rather optimistic, but in reality, Vietnam has to overcome the challenges for HRD in order to improve the socio-economic situation in 21st century. The serious constraining factors faced for HRD are lack of facilities such as classroom, equipment, teaching materials and teaching staff. Especially, as training of teaching staff takes time, it is important to establish a core of human resources development system, where related equipment and facilities should be accumulated for the efficiency of investment.

The Hoa Lac Urban Area is most suitable place for the center of HRD, because related national projects such as HHTP and VNU are to be introduced. The Area should train and educate highly qualified personnel including researchers, engineers, managers, technicians and skilled workers to supply for all over the Vietnam.

(2) Estimation of Demand for Human Resources Development in Higher Education in Hoa Lac

1) Estimation Based on the Policy

The JICA Study Team estimated the demand of higher education in Hoa Lac based on the national policy (see Table 3.4.3). The conditions for estimation are as follows:

- Private universities and colleges are not taken into consideration, because private higher education institutes tend to locate in only Hanoi City and HCMC. The JICA Study Team assumed the ratio of private school as 12 % in 2005, 15 % 2010, 20 % in 2020, taking into consideration the future expansion and new establishment of private schools.
- Only students in full time courses are taken into consideration. The ratio of full time students to the total had been decreasing for 85.5 % in 1992 to 46.4 % in 1996. But in 1997, the ratio went up to 55.1 %. The Study Team assumed the ratio of full time students 58 % in 2005, 60 % in 2010, and 65 % in 2020, assuming that more graduates from upper secondary school would enter universities or colleges keeping pace with developing socio-economic situation.

The Corridor 21 Development

- Number of students attending higher education institutes in Hanoi account for over 30 % of the total. The Study Team assumed the ratio of students in Hanoi 30 % in 2005, 25 % in 2010, 25 % 2010, assuming that universities and colleges in other parts of the country would be expanded.
- Colleges account for 4 % of the total at present. The Study Team assumed that this ratio would not changed.
- The Study Team assumed that the Hoa Lac Urban Area should provide 20 % of the demand for highly educated personnel, because VNU shares 20 % of the total at present.

Table 3.4.3 The Estimated Number of Students in Hoa Lac

| | Unit: number of students | | |
|-------------------------------------|--------------------------|----------|---------|
| | Phase-1A | Phase-1B | Phase-2 |
| Students in Hanoi Metropolitan Area | 190,000 | 244,000 | 424,000 |
| Students in Hoa Lac (estimated) | 38,000 | 48,800 | 84,800 |

Source: MOET & JICA Study Team

2) Estimation based on demand

(a) Demand of Enterprises

Enterprises are facing difficulties in recruiting highly educated personnel such as engineers and managers. The Study Team estimated the demand by the enterprises in Hoa Lac (see Table 3.4.4).

The conditions are as follows:

- According to the questionnaire survey, an enterprise recruits 15 freshmen a year on average.
- The estimated number of enterprises that would locate in HHTP and Phu Cat IZ, are 33 and 15, respectively.
- The Study Team assumed enterprises recruit 30 % of their demand from those in Hoa Lac. Another 70 % are recruited outside. The demand of enterprises may need several categories of personnel, and therefore, the supply side could accord with the demand.
- Hoa Lac will be the core of S&T in Vietnam. This means the personnel trained in Hoa Lac will not necessarily stay on for work in Hoa Lac. The Study Team assumed that 80 % of the labor force trained in Hoa Lac would

The Corridor 21 Development

work outside. Presently, 95 % of engineers are concentrated in Hanoi City and HCMC.

- The number of students in under-graduate course is much more than that in post-graduate course. The JICA Study Team assumed under graduate students in S&T fields were 1.5 times as many as that of postgraduate, three times in humanities.

Table 3.4.4 Academic Field Demanded by Enterprises

| Field | No. of students |
|-------------|-----------------|
| Electronics | 800 |
| Machinery | 900 |
| Physics | 200 |
| Chemistry | 100 |
| Law | 700 |
| Management | 1,400 |
| Economics | 600 |
| Accounting | 500 |
| Total | 5,200 |

Source: JICA Study Team

(b) Demand of Research Institutes

According to the questionnaire survey, the personnel most required by research institutes are the graduates of master or doctor degree in management, economics, machinery and biology fields. The Study Team estimated that the demand generated by research institutes which are expected to move in Hoa Lac, assuming that two third of national institutes are located in Hanoi (see Table 3.4.5).

The conditions for estimation are as below:

- According to the questionnaire survey, a research institute recruits 7.5 freshman a year on an average.
- The Study Team assumed that research institutes would recruit 30 % of freshmen from Hoa Lac and 70 % of personnel trained in Hoa Lac would work outside.
- The Study Team assumed 5 institutes would likely locate in Hoa Lac by 2005.
- The number of students in under-graduate course are 1.5 times the post graduates in S&T field, and 3 times in social-economic and humanities fields.

Table 3.4.5 Academic Field Demanded by Research Institute

| Field | No. of students |
|--------------|-----------------|
| Law | 100 |
| Management | 200 |
| Economics | 300 |
| Politics | 0 |
| Electronics | 600 |
| Machinery | 500 |
| Physics | 400 |
| Biology | 300 |
| Chemistry | 100 |
| Total | 2,500 |

Source: JICA Study Team

(c) Demand of University

As stated above, shortage of teaching staff is one of the urgent problems. Also, upgrading the quality of teaching staff is another problem. The target ratio of teaching staff qualification by MOET is shown in Table 3.4.6.

Table 3.4.6 Target Ratio of Teaching Staff Qualification in Higher Education

| | Unit: % | | | |
|----------|---------|-----------|----------|---------|
| | 2000 | Phase-1A* | Phase-1B | Phase-2 |
| Bachelor | 58.0 | 44.0 | 30.0 | 20.0 |
| Master | 30.0 | 38.0 | 45.0 | 40.0 |
| Doctor | 12.0 | 18.0 | 25.0 | 40.0 |

Source: MOET, * JICA Study Team estimated

The number of teaching staff in higher education by types of qualification was estimated based on the number of students. The ratio of teachers to students was assumed as 13.0 %, which was quoted by the figure in 1995 (see Table 3.4.7).

Table 3.4.7 Ratio of Students to Teaching Staff in Higher Education

| | Unit: 1,000 staff. | | | |
|-------------------|--------------------|-------|-------|-------|
| | 2000 | 2005 | 2010 | 2020 |
| Ratio (%) | 7.8 | 7.7 | 7.7 | 7.7 |
| No. of students | 733 | 1,240 | 1,911 | 3,265 |
| No. of teachers | 57 | 95 | 147 | 250 |
| Bachelor's degree | 33 | 42 | 44 | 50 |
| Master's degree | 17 | 36 | 66 | 100 |
| Doctor's degree | 7 | 17 | 37 | 100 |

Source: JICA Study Team estimated

The Corridor 21 Development

The Study Team assumed the following conditions in order to estimate the demand in 2005.

- Incremental number of teaching staff from 2000 to 2005 as shown in Table 3.4.7 does not include the number of teachers who replace retired ones. The teachers for replacement will be trained within each higher education institute.
- The Study Team assumed that Hoa Lac would train one third of the total demand for training teaching staff as Hoa Lac will be the center of HRD in Vietnam.
- The number of under-graduate students is twice the number of post-graduate students.

The estimation based on the demand of higher education institutes result in the approximation of 12,000 students.

(d) Total demand by investors

The result of estimation in each demand is shown in Table 3.4.8.

Table 3.4.8 Total Demand of Higher Education Personnel

| | Unit: persons |
|-------------------------------|---------------|
| Demand of enterprises | 5,200 |
| Demand of research institutes | 2,500 |
| Demand for teaching staff | 12,000 |
| Total | 19,700 |

Source: JICA Study Team

The figure of 19,700 is the total demand arisen from the development of Hoa Lac in 2005. Hoa Lac should train and educate more people in order to play an important role in HRD in Vietnam and to meet the target set up by MOET.

3.4.2 VNU Relocation

(1) Background of the Government Policy on VNU

The following is the present situation of the Vietnamese higher education policy, which resulted in the proposed Vietnam National University (VNU) relocation project.

1) Increase in the Demand for Higher Education

Recently, the number of students for higher education has been increasing remarkably. This trend will continue due to the expansion of the population of younger generation and the rising enrollment ratio by virtue of the increase in per capita income. The enhancement of higher education in both quality and quantity terms is essential to the social and economic development of Vietnam.

Japan has achieved its accelerated economic growth starting from 1960, when the enrollment ratio of higher education just surpassed 10 percent. At present, the ratio in Vietnam stands at around 4 percent. Under the circumstances, the government has endeavored to expand the capacity for higher education and diversify its educational fields to meet the various needs of the society.

In Vietnam, many schools of specific fields have been developed. Most of them are small in terms of student number. The enlargement of a school size by reorganizing and integrating universities will enable efficient use of educational resources such as university staff and facilities. Recently, some schools have been reorganized to be multifunctional universities to respond to a variety of needs for higher education. In line with this government policy, VNU is expected to be a multinational and comprehensive university to cover the wider fields of education and study.

VNU has currently five affiliated universities located separately in the Hanoi City. They are the Universities of General Education, Natural Sciences, Social Sciences and Humanities, Pedagogy, and Foreign Languages. VNU plans to integrate these affiliated universities in the same campus in the suburbs of Hanoi City.

2) Demand for R&D and Training of Qualified Engineers

Generally speaking, Vietnam has been lagged behind in the fields of production technology and skills in contrast with its high level of genuine science. It has lacked skilled and trained workers necessary for the industrial modernization of the country, which is largely attributable to the inadequate practical training systems chiefly caused by obsolete equipment and facilities as well as insufficient training staff in both quality and quantity.

Recently, the prevailing economic crisis seriously gripping many Asian countries urged Vietnam to recognize the importance of research and development (R&D) for the development of new frontier industries. Also, the importance of natural sciences has been growing for promoting R&D by translating the fruits of research activities into the

The Corridor 21 Development

invention of products and innovation of production technologies. Accordingly, it is urgent to promote R&D and reinforce training systems of engineers and skilled workers in Vietnam. To achieve the objective, enhancement of the science and technology in the country particularly at the higher education level is of the national importance and significance. In light of the situation, the government is planning the VNU relocation, taking into consideration the advancement of R&D as well as training researchers and students in the fields of Technology.

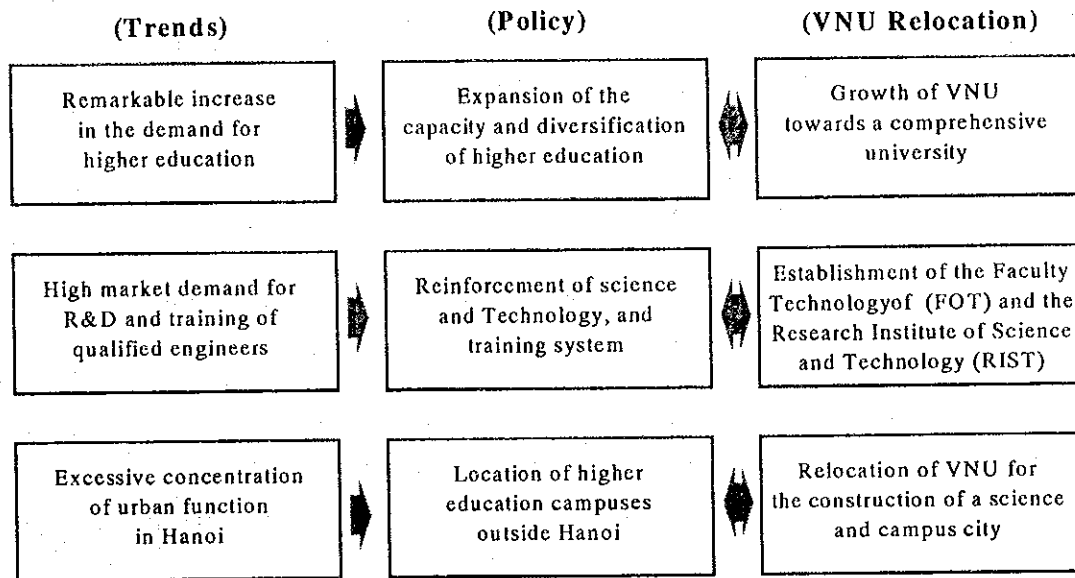
3) Excessive Concentration Problems in Hanoi

In order to alleviate the increasing urban problems of the Central Hanoi due largely to the excessive concentration of urban population and functions, the government has been promoting relocation and new establishment of higher education schools outside the Central Hanoi. At present, Hanoi area accounts for 40 percent of the total number of students of the Vietnamese universities in the whole country. Popularization of higher education will bring about excessive inflow of students into the Hanoi area in the foreseeable future. The VNU relocation project to Hoa Lac is in line with the Government policy. Figure 3.4.1 shows the policy issues of the Vietnamese higher education and the VNU relocation.

(2) Issues for the VNU Relocation

1) Multi-function and Comprehensiveness

VNU is expected to grow as a leading university in Vietnam. In order to meet various needs of national and local levels, VNU should become a comprehensive university with the diversified fields of education and study. VNU plans to involve additional faculties in both applied and interdisciplinary fields. Those fields are expected to contribute to the development of industrial technology, city planning, social welfare, natural and social environment and so on. At the same time, VNU has a role to respond to the various needs of the local people of the new town. In light of this situation, it is necessary for VNU to diversify the fields of education and studies on applied or practical science, interdisciplinary issues and international relations: the new town has the potential to become a center of international exchange.



Source: JICA Study Team

Figure 3.4.1 Policy Issues of the Vietnamese Higher Education and the VNU Relocation

2) Student Numbers

As a comprehensive university, VNU will grow with a relatively large number of students among the Vietnamese universities. The invitation of students to the VNU relocation area is essential to activate the Hoa Lac New Town.

The maximum number of VNU students accommodated in the VNU relocation area should be carefully examined, taking into consideration the optional schemes; i) administrative control over affiliated faculties or ii) cooperative management with joint universities. Also, the campus life of students, availability of teaching staff and their habitation, and environmental implications on the citizen's life need to be carefully considered.

Judging from the building and land use standards of the Japanese Government, 60,000 students can be accommodated in the VNU relocation area of 1,000 ha.

3) Expansion and Integration of VNU

According to the VNU relocation plan, VNU will grow by integrating not only already affiliated universities but also non-affiliated universities in the future. Naturally, however, even affiliated universities have some resentment for being integrated in the relocated VNU due to apprehension of losing their identity and initiative, and this sentiment becomes more serious in the case of non-affiliated universities.

The Corridor 21 Development

These universities should be allowed to keep their independence even after moving in the VNU relocation area. In order to invite affiliated as well as non-affiliated universities to the relocated VNU, flexible arrangements on the organization and the institutional structure should be made, including the following options:

- (a) Complete affiliation to VNU thus to be a part of VNU, or
- (b) Location in the campus of the relocated VNU but remaining independent, keeping a cooperative relationship with VNU.

As for the terminology representing flexible arrangements on the organization and the institutional structure, our report, refers to the term "faculty" as a department of VNU or other university as well as a specified university, seeking for an ideal environment for research zone.

With the participation of other universities in the VNU relocation area, a variety of educational and research activities of VNU will be effectively promoted. The possibility of locating other universities including foreign ones or their branches outside the VNU relocation area should be examined in a viewpoint of the development of the Hoa Lac New Town as a whole.

The Asian Institute of Technology (AIT), which has a branch for training programs on business administration in Hanoi, has been planning to establish it in the new city. The entry of foreign universities will encourage international cultural and academic interchange with the Vietnamese universities and institutes.

The co-operative programs of VNU with the foreign universities will contribute a great deal to developing a variety of VNU activities. Concerning the Japanese universities, the Tokyo University of Technology has an agreement on co-operation in general with VNU and the Hanoi University of Technology. Apart from that, the Ritsumeikan University has a similar agreement with the Hanoi University of Technology (HUT). The Teikyo University has exchange programs with the Hanoi University of Technology (HUT). In light of these situations, the importance is the network between VNU, and other universities and institutes in order to work multi-functionally as a whole.

The diversification of VNU involves many institutes and agencies concerned. In particular, it is crucial to obtain the support from the government sectors including the MOET.

4) Construction of a Science and Campus Town

VNU relocation project will be a core part of the construction projects of the new town. The existence of universities of natural sciences and technology and research institutes will be a symbol of the new town. Therefore, the priority of the VNU relocation should be placed on the relocation of the University of Natural Sciences and associated institutes.

In Japan, research institutes of the Tsukuba University constitute core parts of the Tsukuba Science and Campus City. The Tokyo University of Technology has established the branches of its department of technology in Yokohama City to the southwest of Tokyo. Furthermore, the Tokyo University is going to extend its branches of research in Kashiwa City to the north of Tokyo seeking for an ideal environment for research zone.

VNU is expected to work as a basic public center for the Hoa Lac New Town and to meet the various needs of the citizens. In this respect, some kinds of facilities of VNU should be constructed, considering citizens' use. This category of facilities will include a hospital and other health care centers, museums, sports facilities, libraries and so on. These facilities should be open to the public.

On the other hand, it is necessary to provide facilities and services indispensable to the VNU's activities and daily lives of teaching staff and students. These facilities and services will include transportation systems, water supply, electricity supply, telecommunications, sanitary and sewerage systems, parks, housing, various civil services, and so on.

The campus of VNU should be carefully designed, taking into consideration of the environmental improvement of the new city as a whole. Another aspect to be considered is that the activities and daily lives of students and teaching staff will cause a great impact on the citizens' lives.

In this context, the excessive concentration of university students in the VNU relocation area should be avoided. Thus, the possibility for the location of schools of higher education will be examined not only in the VNU relocation area but also in other areas focusing on the environmental harmonization of the whole urban development. By the year 2020, the development of the town, together with inside and outside the VNU relocation area including universities and institutes, will naturally form an education and research complex.

The Corridor 21 Development

5) Recruiting of Students and Teaching Staff

One of the crucial issues is how to recruit talented teaching staff and researchers as well as students for the relocated VNU. Certain incentives should be provided to attract them, such as provision of decent housing, attractive salaries, attractive conditions of campus and daily life and so on. The premium of salaries for the staff might be a possible option. In case of the Tsukuba Campus City Project in Japan, the staff of the Tsukuba University and other government sectors had the allowance of the premium of salary (maximum 8 % of their salaries) within a limited period after the start up of the town construction.

As a matter of fact, there are some competing universities located in the Central Hanoi Area, and therefore, if the relocated VNU fails to provide attractive conditions, such recruitment will face serious difficulties. Planning the student numbers should be carefully decided, assessing the VNU's capacity and attractiveness of its campus facilities and living environment for teaching staff and students.

The training and recruiting teaching staff should be started to prepare for the expansion and the establishment of new faculties at the next stage of the implementation of the VNU relocation. In the light of the majority of the existing VNU teaching staff are over 55 years old, it is urgent to nurture the staff of younger generations.

There are following ways of training and recruiting teaching staff.

(a) Training

- Training through VNU's graduate courses
- Training VNU graduates in other universities and institutes (including accrediting transfer system between VNU and other universities)
- Study abroad

(b) Recruiting

- Recruiting VNU teaching staff and graduates
- Recruiting teaching staff and researchers from other universities, research institutes and companies home and abroad including qualified Vietnamese overseas

To recruit the staff of other universities and institutes, it is indispensable not only to present attractive conditions for candidates but also to keep close cooperation with those organizations concerned in order to secure qualified persons. Many VNU staffs are

trained in universities abroad. The importance of studying abroad for training the teaching staff should be emphasized.

6) Supporting Infrastructure

Supporting infrastructure such as transportation systems, water, electricity, telecommunications, sanitary and sewerage systems, and so on, should be provided within the reasonable time and with the appropriate service quality. However, it is envisaged that VNU would not be able to manage the infrastructure development. In other words, VNU should well cooperate with the agencies responsible for the infrastructure development.

7) Education of Part-time Students

Facilities for the education of VNU's part-time students who have jobs in Hanoi should remain in Hanoi even after the relocation of VNU to Hoa Lac.

(3) Process of the VNU Relocation

In Britain Oxford and Cambridge Universities were established in late 12th century, and in Japan, Tokyo University was founded about 100 years ago. These prominent universities have experienced a variety of changes in their campus facilities in accordance with the changing culture and science over a long period of time. In light of this, campus development planning needs to be made on a long-term basis. The VNU relocation will proceed, according to the following procedure.

1) Phase-1A (by 2005) – Preparatory Process and the Relocation of the Affiliated University

- (a) The preparatory process involves the formation of a consensus on relocation among individual affiliated universities, allocation of budget, arrangement of project finance, and land acquisition of the relocation area.
- (b) As the first step of the VNU relocation, the Faculty of Technology (FOT) will be established party by reorganising the University of Natural Science. Priority should be given to the relocation of the University of Natural Science and the establishment of FOT that is closely related with HHTP development.

Also, the “Research Institute of Science and Technology (RIST)”, will be established at this stage. RIST will be equipped with an “Open Laboratory” as its core function.

The Corridor 21 Development

For daily training of students and research activities of FOT and the University of Natural Science, laboratory facilities are indispensable. Therefore, funding for relocation and renewal of the laboratory facilities should be secured.

- (c) The Faculty of Law and the Faculty of Economics & Finance will be established by reorganising the University of Social Sciences and Humanities. By establishing these faculties, VNU will be expected to cope with the problems appearing in the process of the industrialization and modernization of the Vietnamese economy and society, particularly concerning the management of R&D and its related business activities of HHTP.
- (d) Related institutions and facilities are to be established to develop the nation-wide education and research, as well as to build an inter-relationship with foreign institutes.
- (e) In the process of reorganization, adjustment and unification of the functions of universities, faculties, and institutes, VNU will take a gradual step towards a comprehensive university.

2) Phase-1B (By 2010)

The scope of the fields focused in the VNU relocation area will be diversified by adding the new fields in accordance with the advancement of the Vietnamese society. They will include medical treatment and social welfare, environmental protection, architectural work for urban construction, and the development of international relations.

3) Phase-2 (By 2020) and thereafter

- (a) The organizations and facilities in the VNU Area will grow and be diversified in accordance with the expansion of the scope of education, research and cultural activities and with the increase in the numbers of students and staff. In this phase, a complex of universities and institutes will appear inside and outside the VNU Area, and networks among them will be built.
- (b) With the development of industry and the improvement of living standard, such fields as arts and culture will be added in the long run (after 2020).

The VNU relocation will proceed keeping pace with the other development projects for the construction of the Hoa Lac New Town.

The Corridor 21 Development

The development framework in terms of the number of students will be shown in Table 3.4.9.

According to the Prime Minister's decision on September 1998, the organizational structure for general education is to be abolished. Regarding this trend, the undergraduate student numbers include general education and professional education courses.

Table 3.4.9 The Estimated Number of Students (Case 1)

| Field for education and study | 2005 | | | | 2010 | | | | 2020 | | | |
|---------------------------------|---------------|--------------|------------|---------------|---------------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|
| | Under | Master | Doctor | Total | Under | Master | Doctor | Total | Under | Master | Doctor | Total |
| Natural Sciences | 5,200 | 600 | 200 | 6,000 | 5,200 | 600 | 200 | 6,000 | 6,070 | 700 | 230 | 7,000 |
| Social Sciences and Humanities | 5,600 | 300 | 100 | 6,000 | 5,600 | 300 | 100 | 6,000 | 5,600 | 300 | 100 | 6,000 |
| Pedagogy | 7,800 | 900 | 300 | 9,000 | 7,800 | 900 | 300 | 9,000 | 8,700 | 1,000 | 300 | 10,000 |
| Foreign Languages | 3,900 | 90 | 10 | 4,000 | 3,860 | 120 | 20 | 4,000 | 6,835 | 150 | 15 | 7,000 |
| Technology | 1,730 | 200 | 70 | 2,000 | 2,600 | 300 | 100 | 3,000 | 6,940 | 800 | 260 | 8,000 |
| Law | 1,370 | 110 | 20 | 1,500 | 1,820 | 150 | 30 | 2,000 | 2,730 | 225 | 45 | 3,000 |
| Economics & Finance | 1,370 | 110 | 20 | 1,500 | 1,820 | 150 | 30 | 2,000 | 2,730 | 225 | 45 | 3,000 |
| Agro-Forestry | | | | | 880 | 100 | 20 | 1,000 | 3,520 | 400 | 80 | 4,000 |
| Pharmacy | | | | | 870 | 100 | 30 | 1,000 | 2,600 | 300 | 100 | 3,000 |
| Architecture | | | | | 880 | 100 | 20 | 1,000 | 1,760 | 200 | 40 | 2,000 |
| State Management | | | | | 910 | 75 | 15 | 1,000 | 1,820 | 150 | 30 | 2,000 |
| Health care and Social Services | | | | | 550 | 300 | 150 | 1,000 | 1,100 | 600 | 300 | 2,000 |
| International | | | | | 910 | 75 | 15 | 1,000 | 2,730 | 225 | 45 | 3,000 |
| Total | 26,970 | 2,310 | 720 | 30,000 | 35,700 | 3,270 | 1,030 | 40,000 | 53,135 | 5,275 | 1,590 | 60,000 |

Source: JICA Study Team

Note: Shadowed parts represent the current affiliated universities of VNU.

Student numbers of General Education are allocated between individual departments.

By 2005: All affiliated universities will be relocated.

Department of Technology will be established by reorganizing University of Natural Sciences.

Department of Law and Department of Economics and Finance will be established by reorganizing University of Social Sciences and Humanities.

By 2010: Following fields of departments will be established: Agro-forestry, Pharmacy, Architecture, State Management, Health care and Social Services, International Relations.

Table 3.4.9 The Estimated Number of Students (Case 1)

| Field for education and study | 2005 | | | 2010 | | | 2020 | | | Total | |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|
| | Under | Master | Doctor | Under | Master | Doctor | Under | Master | Doctor | | |
| Natural Sciences | 5,200 | 600 | 200 | 5,200 | 600 | 200 | 6,000 | 6,070 | 700 | 230 | 7,000 |
| Social Sciences and Humanities | 5,600 | 300 | 100 | 5,600 | 300 | 100 | 6,000 | 5,600 | 300 | 100 | 6,000 |
| Pedagogy | 7,800 | 900 | 300 | 7,800 | 900 | 300 | 9,000 | 8,700 | 1,000 | 300 | 10,000 |
| Foreign Languages | 3,900 | 90 | 10 | 3,860 | 120 | 20 | 4,000 | 6,835 | 150 | 15 | 7,000 |
| Technology | 1,730 | 200 | 70 | 2,600 | 300 | 100 | 3,000 | 6,940 | 800 | 260 | 8,000 |
| Law | 1,370 | 110 | 20 | 1,820 | 150 | 30 | 2,000 | 2,730 | 225 | 45 | 3,000 |
| Economics & Finance | 1,370 | 110 | 20 | 1,820 | 150 | 30 | 2,000 | 2,730 | 225 | 45 | 3,000 |
| Agro-Forestry | | | | 880 | 100 | 20 | 1,000 | 3,520 | 400 | 80 | 4,000 |
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By 2010: Following fields of departments will be established: Agro-forestry, Pharmacy, Architecture, State Management, Health care and Social Services, International Relations.

(4) Reinforcement of Research and Practical Training, and Linkage with IHTP

Reinforcement of the VNU's functions of research and practical training is the first priority of the relocation project. The University of Natural Sciences covers the fields of genuine and applied sciences but not covers the practical technologies of production. In Vietnam, schools of natural science and schools of technology have developed separately at the higher education level. However, science and technology are becoming interactive for the promotion of R&D.

In Japan, universities covering the fields of natural science as well as technology are common. The Tokyo University was the first case in Japan. The Japanese universities have focused on the higher education that consists of the fields of technology as well as natural science, endeavoring to rapidly catch up with the advanced industrial countries. One of the characteristics of Japanese higher education is that the students measuring technology occupy high ratios, compared to the total number of students at higher education.

The reinforcement of the University of the National Sciences is an urgent problem. Generally speaking, in Vietnam, postgraduate courses of universities are minor in the fields of natural sciences, compared with those of national institutes. Nowadays in Japan, an increasing number of national institutes have the function of issuing doctorates. This trend reflects the rapid progress of specialization of S&T. In the meanwhile, the renovation of the Japanese universities is an urgent issue in order to vitalize their educational activities and researches.

Researches, whose objectives are defined by the government sectors, could effectively be conducted at the institutes. On the contrast, universities have a comparative advantage on frontier researches, which owe very much to the initiatives and originalities of individual researches.

In this sense, both countries have similar problems with universities. With its comprehensive academic system and talented staff, the University of Natural Sciences is expected to take a leading role in developing the frontiers of natural science and, at the same time, to contribute to developing a wide range of fields which need interdisciplinary approaches such as ecological treatment for environmental protection for the new town including VNU Area.

Apart from this, VNU has a great potential to improve R&D by establishing the Faculty of Technology (FOT) holding close linkage with the University of Natural Sciences. VNU

The Corridor 21 Development

should take an active role to improve the Vietnamese education and research on technologies based on related sciences. Also, the establishment of the FOT and its related research institutes is essential for the development of R&D in cooperation with institutes that will be located in the HHTP Area. The FOT will cover the fields of information technology (informatics, electronics and telecommunication), biotechnology, mechatronics, new materials, new energy and environment technology that are the priority categories of HHTP.

Together with the establishment of the FOT, the Research Institute of Science and Technology (RIST) will be established. RIST will be equipped with the Open Laboratory, which will be openly utilized not only by the FOT but also by outside universities and research institutes particularly by those located in HHTP. RIST holding the Open Laboratory is expected to link to outside institutes through co-operative work of R&D with outside institutes.

To cover the fields of technology necessary for the modernization of the Vietnamese industrialization, it is indispensable that other leading institutes such as the National Center for Natural Sciences and Technology (NCST), the Hanoi University of Technology, or their branches, will move in the Hoa Lac New Town. The government agencies concerned should encourage such movement, and as a result, co-operative works and networking between VNU and other institutes will provide the basis for the promotion of research and education in the fields of Technology.

The following figure shows the relationship between VNU and HHTP, such as NCST or its branches on the HHTP side will be essentially important. The existence of VNU together with RIST and the Open Laboratory will provide considerable incentives for the other institutions of HHTP.

(5) Basic Concept for the Campus Planning

The following points should be properly examined in formulating the campus planning:

- (a) Gradual development in harmony with local community should be made.
- (b) An easy access to the faculties, institute and other facilities should be ensured since the VNU Area is very large.
- (c) Creation of a distinctive and attractive atmosphere which is suitable for the education of young talented students.
- (d) For the purpose mentioned above, facilities planning, land use planning, special layout planning, and environmental planning should be carefully made, considering the supply of necessary energy, and sewage and waste treatment, information and telecommunication systems, mobility and accessibility.
- (e) The VNU Campus Zone facing the center of a new town should be open to the public in order to meet the needs of citizens of the new town and local people.
- (f) Regarding the linkage of HHTP, RIST should be located along the roads that link the areas of VNU and HHTP. The physical linkage between VNU and HHTP is a symbol of the integrated functions between the two.
- (g) Regarding the academic interrelations among faculties (including current affiliated universities), their locations will be grouped into four zones: Natural Science & Technology, Social Sciences, Pedagogy & Foreign Languages and Health Care & Social Service.
- (h) Construction area should be compact by intensive land use in the Phase-1 (by 2010). Thus, the design should be flexible enough to adjust possible changes in their location, as individual facilities will grow in size.

(6) Reinforcement of Research and Training on Technology, and Linkage with HHTP

(7) The Faculty of Technology (FOT) and the Institute of Science and Technology (RIST)

The curricula of the University of Natural Sciences cover major fields of R&D required for the development of industrial sector and society as well as for environmental improvement.

The Corridor 21 Development

These fields include mathematics, physics, informatics, electronics and telecommunication, chemistry, biology, environment and so on. Thus the university's teaching staff and researchers, particularly in applied sciences could possibly work for FOT. FOT has both undergraduate and graduate courses. The FOT will primarily start undergraduate courses. The courses aim to produce competent engineers with capabilities for application of basic theories and practical skills of technology. In early school years, undergraduate courses will have preparatory education courses including fields of natural sciences related to professional courses and social sciences in general. Professional courses will begin with basic fields including electronics, chemistry, biotechnology and mechanics. Postgraduate courses will be organized to promote interdisciplinary studies on informatics, electronics and telecommunication, biotechnology, mechatronics and new materials, which should be started in the early stage. Postgraduates are expected to be qualified junior researchers to work for institutes and companies located in the HHTP area.

Together with FOT and RIST will be established. The function of RIST is to organize practical training courses mainly for the students and researchers of FOT and the University of Natural Sciences. RIST will start with laboratories of basic equipment for professional training. The organization of RIST will consist of the staff for training, researches and management of the laboratories. For the promotion of training, R&D and exchanges of students, teaching staff and researchers, RIST is expected to extend co-operative relationships with outside universities and institutes, particularly with the NCST, whose branches will be relocated in the area of HHTP.

The training of FOT:

- (a) Basic technologies based on core natural sciences that are closely linked with the curricula of the University of Natural Sciences and the technologies carefully designed, but not narrowly specified so as to be applicable to a wide range of works required by industrial sectors. The level of the technologies should be comparable to international standards of advanced countries.
- (b) Practical training with good equipment for experiments, measurements, analyses, data processing and information networking.
- (c) Credit exchange, exchange of students and teaching staff, and co-operative research activities (workshops, seminars, conference, joint projects, etc.) among FOT, NCST, HUT and other universities and institutes, home and abroad.

The Corridor 21 Development

- (d) Encouragement of students' entrepreneurship by preparing training programs of business administration and of language skills for international communication; these programs will be properly organized with the support by the related departments of affiliated universities and institutes including the Hanoi School of Business of VNU.
- (e) Cooperative activities with industrial sectors through joint projects of R&D and training of researchers.
- (f) Center for designing and organizing information-networking systems of VNU including correspondence education.

CHAPTER 4

DEVELOPMENT SCENARIO AND FRAMEWORK



CHAPTER 4 Development Scenario and Framework

4.1 Development Scenario and Framework

The reality of the Corridor 21 Development should be carefully examined as to how to introduce diverse urban functions and to induce the settlement of people, in order to create a new satellite city in the Corridor 21 Development. A large-scale urban development cannot be created only by means of administrative control and/or conducive measures from the urban planning aspects. The real issue is how to create an attractive urban space for the purpose of introducing diverse urban functions as well as settlement of people.

Particularly, associated with the planned urban functions such as VNU and HHTP, highly intelligent people with relatively high incomes and diverse value consciousness are expected to reside in the Hoa Lac Urban Area. Therefore, its living environment should be attractive enough to induce the settlement of such categories of people. The phase-wise basic development scenario will consist of the following three conceptual phases (See Figure 4.1.1). However, in the light of the current economic crisis and the resultant extremely tight fiscal situation of the Government, an alternative “Action Plan,” designed to minimize the initial capital investment, will be proposed for consideration by the Government.

4.1.1 Development Scenario Phase-1 (2000 to 2010)

The first phase, which is referred to as the “**initiation phase**” is to strategically introduce the principal urban functions, such as VNU and HHTP, in order to initiate and put the Development on the right implementation track. As a matter of fact, VNU and HHTP development will be the “two strong engines” to pull the Development towards actual implementation. In other words, the Development is largely dependent upon the successful introduction of these two components.

This phase may take up to the year 2010, during which the Development will progress in two sub-phases, i.e. **Phase-1A** by the year 2005 and **Phase-1B** by the year 2010. Phase-1A is categorized as the initial start-up phase and Phase-1B as the momentum-gaining phase.

In Phase-1A, VNU will achieve the relocation of its four affiliated universities (Natural Science, Social Science and Humanities, Pedagogy, and Foreign Languages) and the establishment of three new departments (Technology, Law, and Economics) with the total number of 30,000 students. Meanwhile, HHTP will achieve the partial development of five planned zones (R&D,

The Corridor 21 Development

High-Tech, Center, Business, and Residential) with the total of 9,000 employed population in about 250 hectares.

In the subsequent Phase-1B, VNU will expand its departments (Agro-forestry, Pharmacy, Architecture, State Management, Health Care and Social Services, and International Relations) with the total number of 40,000 students. On the other hand, HHTP will expand the scale of the zones to increase to the total number of 15,000 employed population in 550 hectares.

Accompanied by the VNU and HHTP development, construction industries and service industries will emerge from the beginning of this phase. Particularly, massive construction demand will rapidly ripple over the construction industries in Xuan Mai and Mieu Mon. Also, international exchange will be an inseparable part of the future economic growth, and there will be an upsurge for cultural and recreational demand as per-capita incomes grow and a five-day working system becomes popular. Son Tay, associated with the Dong Mo Lake, will be the center for cultural and recreational activities.

However, the development in this phase will be characterized as the “self-contained development” centering the Hoa Lac Urban Area, without being strongly linked with Central Hanoi nor with the other areas in the Corridor 21 Development. This implies that the people living in the Hoa Lac Urban Area will mostly reside and work therein without generating massive demand for commuting to and from Central Hanoi. Although the Lang-Hoa Lac Highway will be expanded to four lanes after the year 2005, other mass transport modes, such as a mass railway transit (MRT), may not become necessary in this phase.

Among the infrastructure development, water supply for the Hoa Lac and /Xuan Mai is of the prime importance due to its prerequisite nature for urban development as well as its financial and time-wise implications for development. Therefore, the proposed water supply project, i.e. using Da River as water source for the Development, should be fast-tracked as an independent project so that water will have been ready when the urban functions in the area come to operation. Other infrastructure and public/community facilities will be developed on a staged basis, depending on the demand generated from the Development.

4.1.2 Development Scenario Phase-2 (2010 to 2020)

The second phase, which is referred to as the “growing phase,” is to achieve the development momentum towards the creation of a multi-functional satellite town with more diverse urban functions and more settlement of people.

The Corridor 21 Development

This phase may take up to the year 2020, the time when Corridor 21 Development will have been substantially completed with the total population of some 600,000. The original M/P prepared by MOC was planned to have one million by the end of this phase, but it was downscaled by the JICA Study Team.

In this phase, the Hoa Lac and Xuan Mai Urban Area will grow to a 500,000 town, having 400,000 and 100,000 population respectively. The total number of VNU students will increase to 60,000 in the Campus Zone of about 800 hectares, and the total number of employed population in HHTP will increase to 25,000 in the area of about 800 hectares. Also, apart from the HHTP development, industrial development will grow in Phu Cat in Hoa Lac and Xuan Mai, the total area of which will amount to about 600 hectares.

In this phase, as various social and economic activities will be thriving in the Corridor 21 Development, the primary linkage between the Hoa Lac and Xuan Mai Urban Area and Central Hanoi will be much strengthened, followed by the strengthening of the secondary linkages between Hoa Lac and other areas. Consequently, various service industries will agglomerate in the Corridor 21 Development in general, and in particular, in the Hoa Lac Urban Area. The C-21 Urban Center in Hoa Lac will be the core of the service industries, gathering many visitors for cultural and international exchange, sports and leisure, civic services, health and medical care, physical distribution, commerce and business, and so on.

The strong linkage between the Hoa Lac and Xuan Mai Urban Area and Central Hanoi will eventually necessitate the introduction of a mass railway transit (MRT) system. Conversely, it can be said that without the convenient MRT system, the Corridor 21 Development will limit its potential for growth as a multi-functional satellite town. It is envisioned that the economic situation of Vietnam after the year 2010 would make it possible to introduce the MRT system on a privatized basis. Also, the strengthened inter-city linkages among the towns in the Corridor 21 Development would necessitate the introduction of a mass transportation system, although its scale may not be as large as that to Central Hanoi.

This phase will face increasing pressure of absorbing the spilled-over population from Central Hanoi area, as well as the increasing demand for diverse urban functions including those required for international exchange such as hotels, convention halls, international exhibitions, tourism resorts, and so on. Also, as the per-capita incomes of the Hanoi citizens steadily grow, certain motorization will take place, and the citizens' increasing bargaining power will bring about certain consumerism, on the one hand, and a variety of housing demand, on the other hand. The Corridor 21 Development will properly respond to these changing circumstances.

The Corridor 21 Development

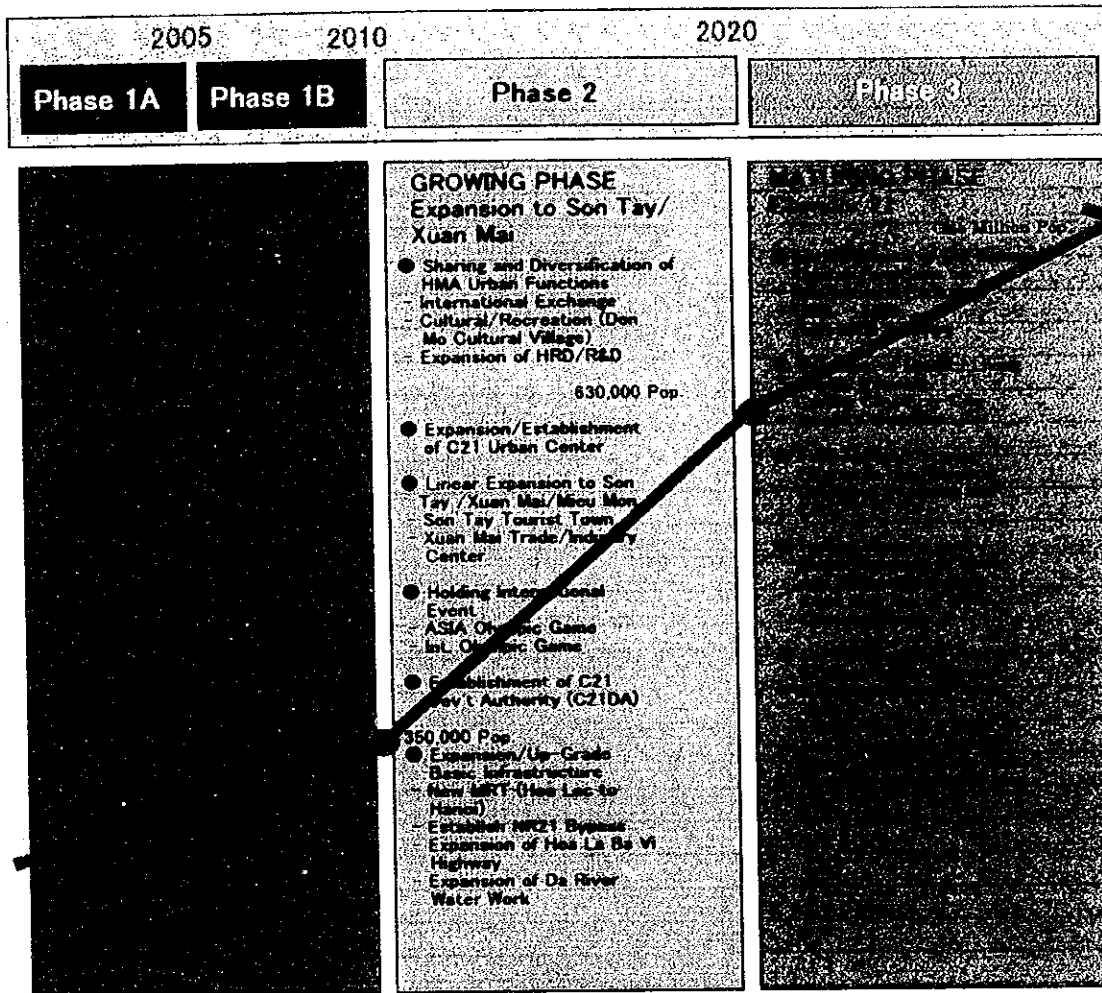
As a matter of fact, one of the key issues that will dominate the development of this phase will be how to successfully formulate the housing market where even the low-to-medium income groups can afford to purchase quality housing. In this context, appropriate housing policies should be well established to support and nurture a healthier housing market, as the housing sector is one of the important macro-economic stimulators. The JICA Study Team's vision is that by the end of this phase, more than 20,000 residents in Hoa Lac will commute to Central Hanoi for work, which implies that a considerable number of population will be attracted to reside in the area just as a dormitory town.

4.1.3 Development Scenario Phase-3 (After 2020)

The third phase, which is referred to as the “**maturing phase**,” during which the Development will be maturing towards a substantive satellite town, having diverse urban functions and quality residential function absorbing spilled-over population of Central Hanoi area.

In this phase, earlier developments will be partly renewed and redeveloped to meet the changing demands of the residents, and the landscape and environment of the area will change to provide more comfortable and convenient place for the people to live, work, and enjoy. The Corridor 21 Development will have been world famous of its “**eco-science city**” where many foreigners will gather for various purposes. In this phase, a new international airport is likely to be established in Mieu Mon, and a new motorway linking Hanoi City to HCMC will also link to the Corridor 21 Development. These will surely give further impetus for the development of the Corridor 21 Development.

Over this phase, the Corridor 21 Development will be nearing a one-million town, providing more balanced and quality urban space to absorb different categories of residents, such as different generations, different professions, different income levels, and so on.

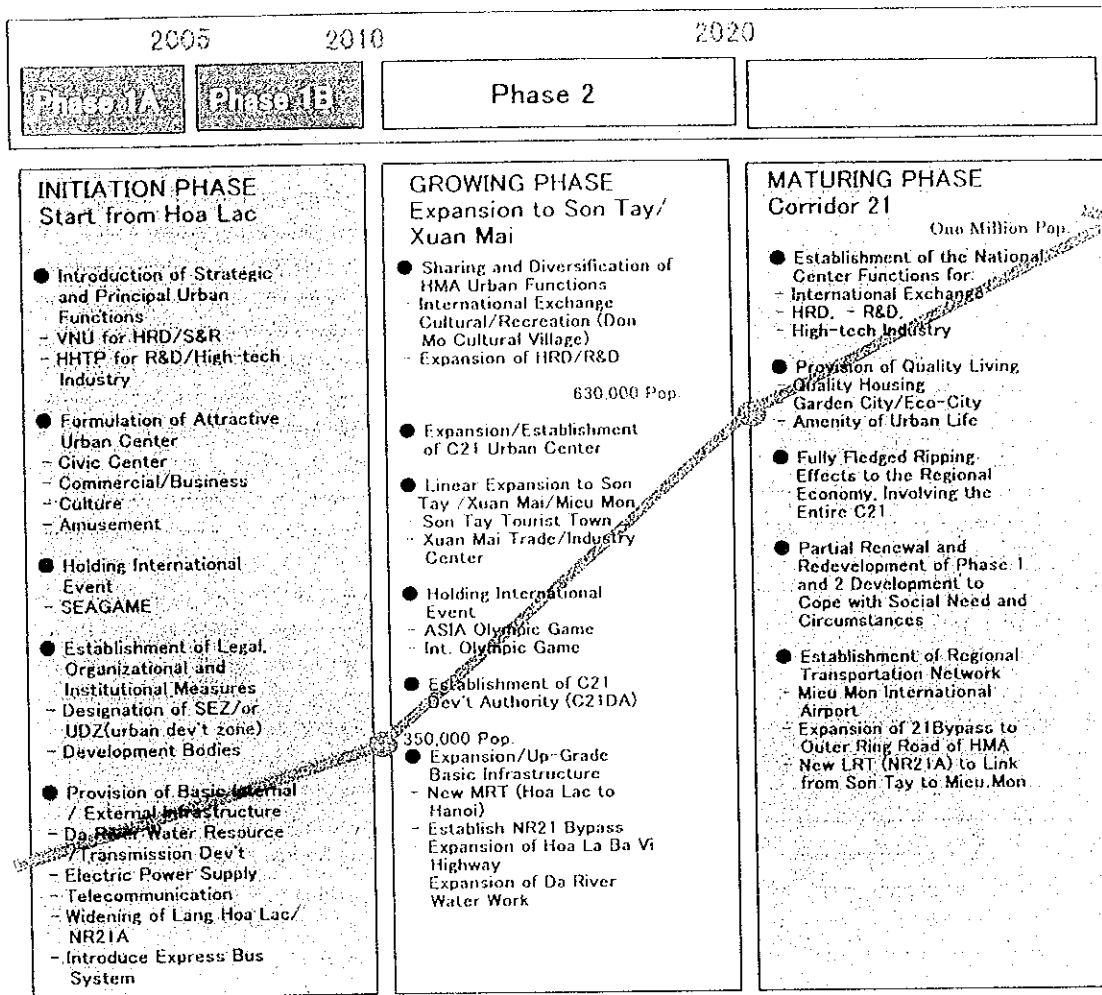


Source: JICA Study Team

Note: The folding line shows the expected tendency of the population increase in the Corridor 21 Development, and the Corridor 21 Development is expected to be substantially complete by the year 2020 with the population in the neighbourhood of 600,000, although the population may not arrive at one million level.

Figure 4.1.1 Spatial Growth Scenario of the Corridor 21 Development

Figure 4.1.2 shows the growth distribution scenario of the Corridor 21 Development. As illustrated, the existing districts of Son Tay, Xuan Mai, and Mieu Mon will grow in the form of an “expansion” centering around the existing urbanized or community areas, whereas, Hoa Lac will be a “new development” gradually influencing its ripple effects over the other districts. It is presumed however that such ripple effects would remain at moderate levels until the development of Hoa Lac become substantial and conspicuous.

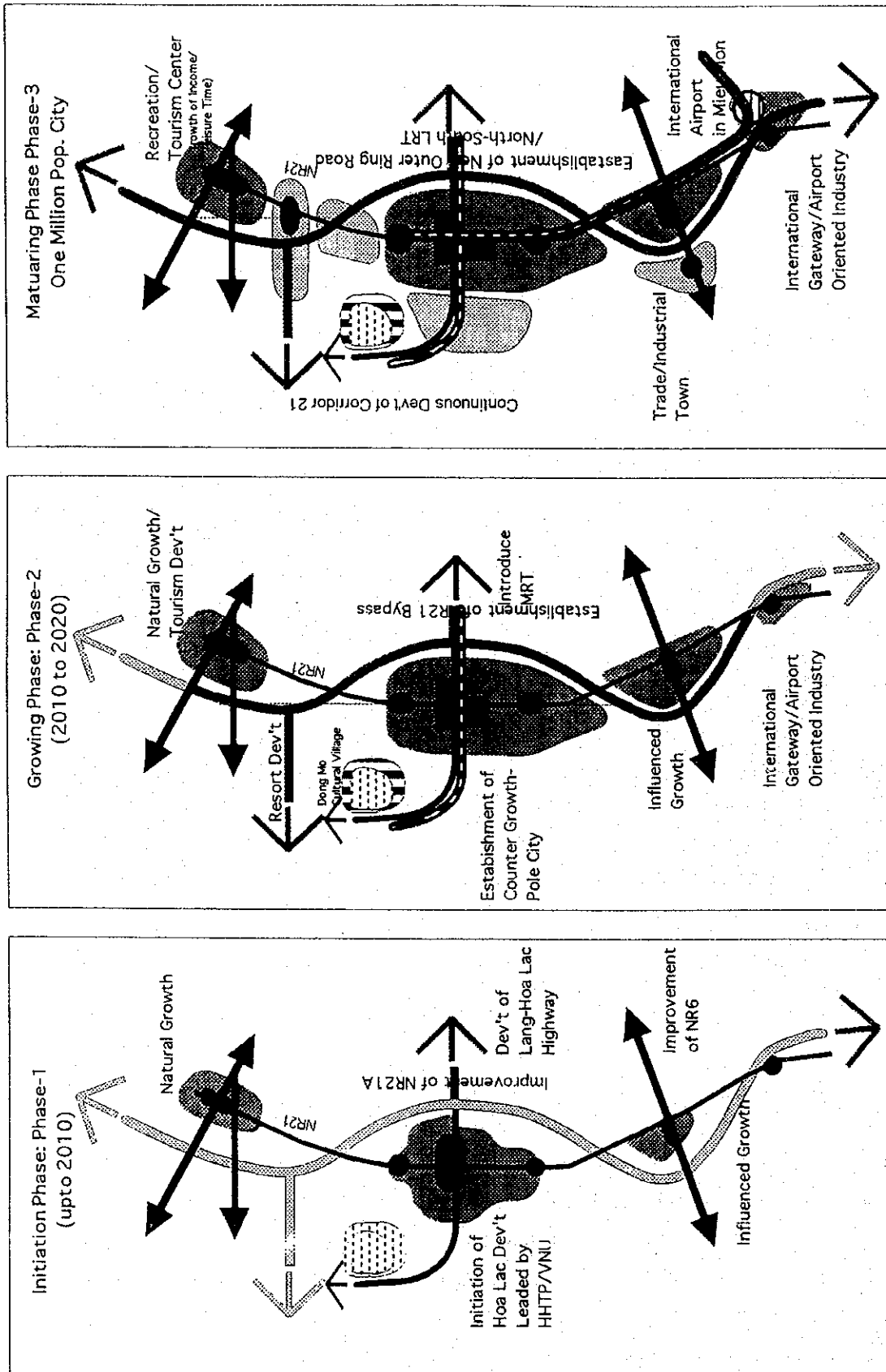


Source: JICA Study Team

Note: The folding line shows the expected tendency of the population increase in the Corridor 21 Development, and the Corridor 21 Development is expected to be substantially complete by the year 2020 with the population in the neighbourhood of 600,000, although the population may not arrive at one million level.

Figure 4.1.1 Spatial Growth Scenario of the Corridor 21 Development

Figure 4.1.2 shows the growth distribution scenario of the Corridor 21 Development. As illustrated, the existing districts of Son Tay, Xuan Mai, and Mieu Mon will grow in the form of an “expansion” centering around the existing urbanized or community areas, whereas, Hoa Lac will be a “new development” gradually influencing its ripple effects over the other districts. It is presumed however that such ripple effects would remain at moderate levels until the development of Hoa Lac become substantial and conspicuous.



Source: JICA Study Team

Figure 4.1.2 Growth Distribution Scenario of Corridor 21 Development