

THE REPUBLIC OF INDONESIA
GTA-117

STUDY ON
LONG-TERM AND MEDIUM-TERM PLAN
FOR TELECOMMUNICATIONS NETWORK
IN SURABAYA AND SURROUNDING AREAS
(GERBANGKERTOSUSILA AREA)

FINAL REPORT
VOLUME I

JANUARY 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

THE REPUBLIC OF INDONESIA
GTA-117

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JANUARY 1991



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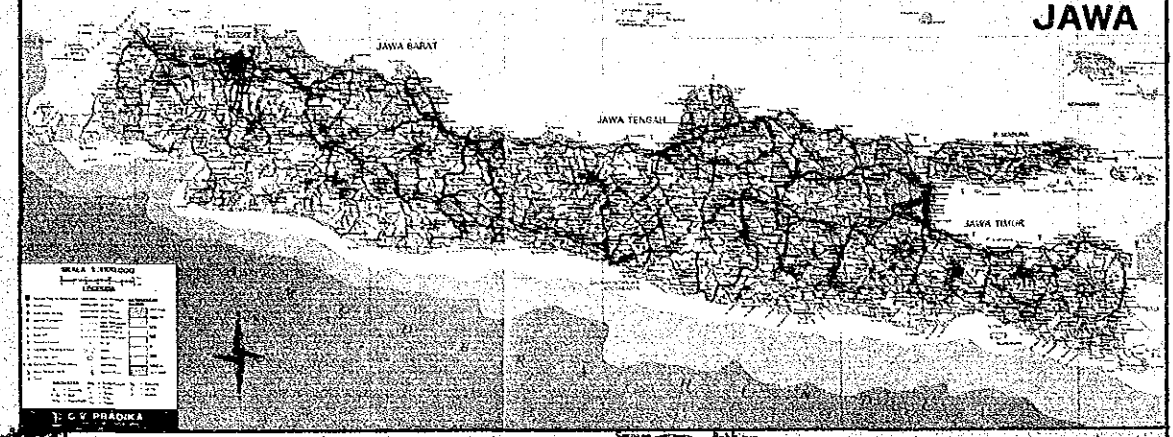
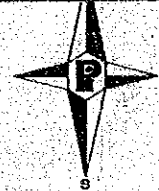
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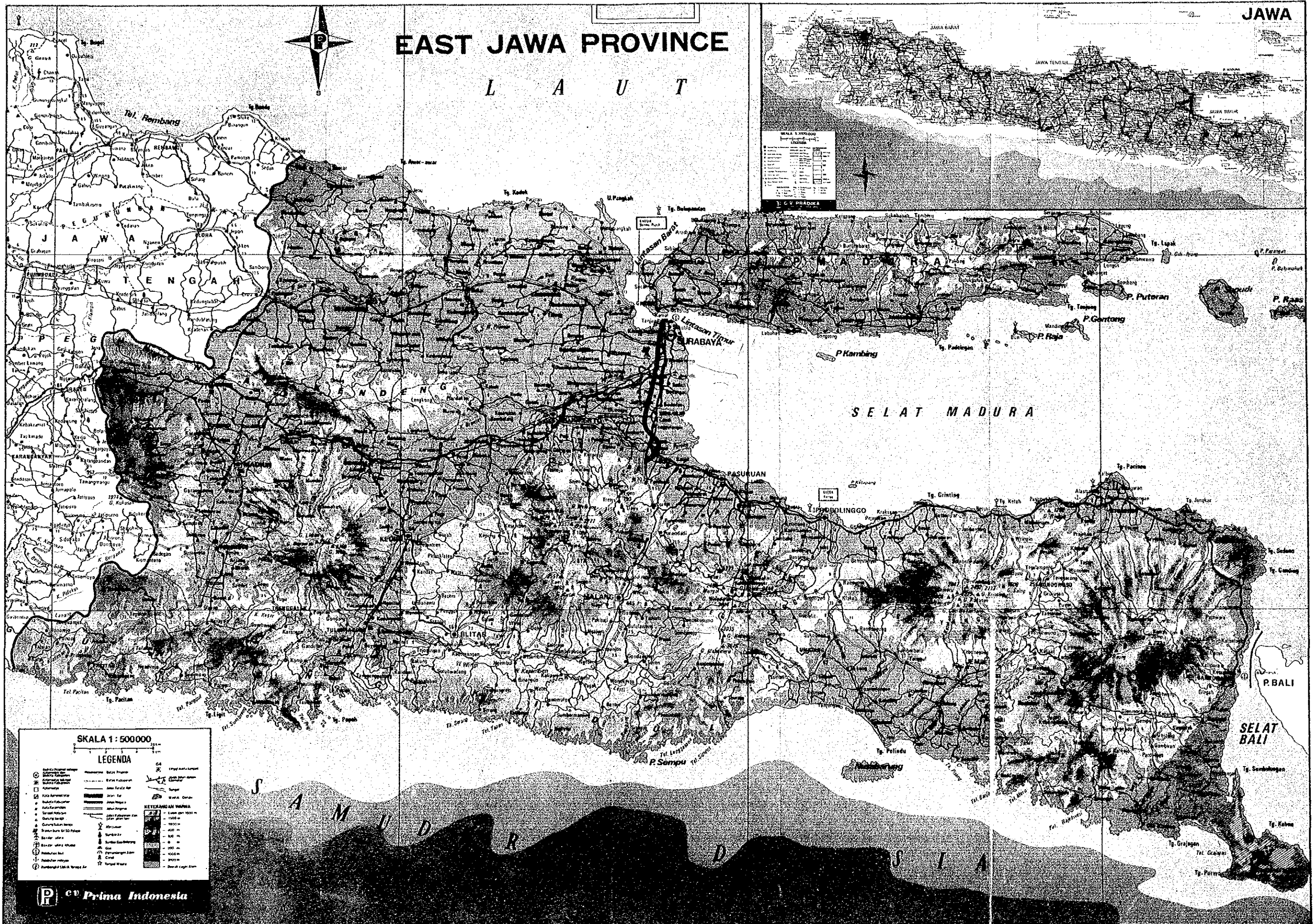
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EAST JAWA PROVINCE

L A U T



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LEGENDA
A detailed legend for the main map, including symbols for various features like roads, rivers, and elevation contours.

P R E F A C E

In response to a request from the Government of the Republic of Indonesia, the Japanese Government decided to conduct a study on Long-Term and Medium-Term Plan for Telecommunications Network in Surabaya and Surrounding Areas and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a study team headed by Mr. Satoru Kushida, The Nippon Telecommunications Consulting Co.,Ltd., twice between October 1989 and November 1990.

The team held discussions with the officials concerned of the Government of Indonesia and conducted field surveys. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

January 1991

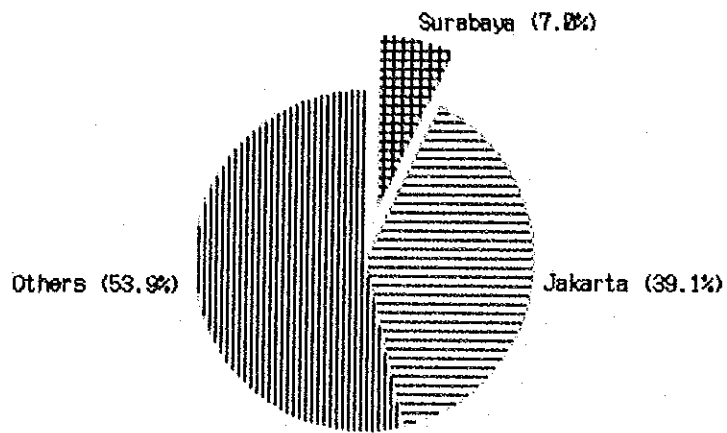


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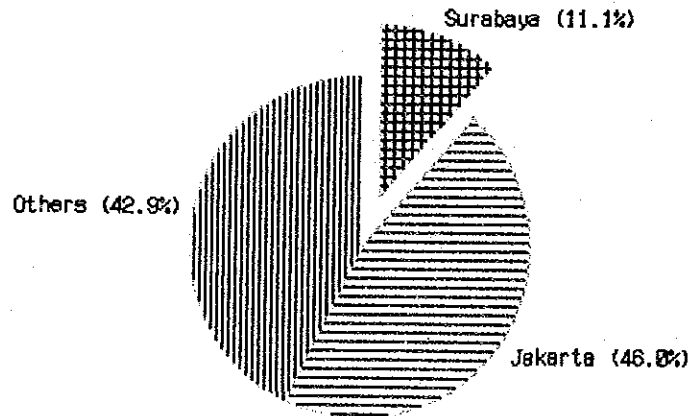
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Japan International Cooperation Agency

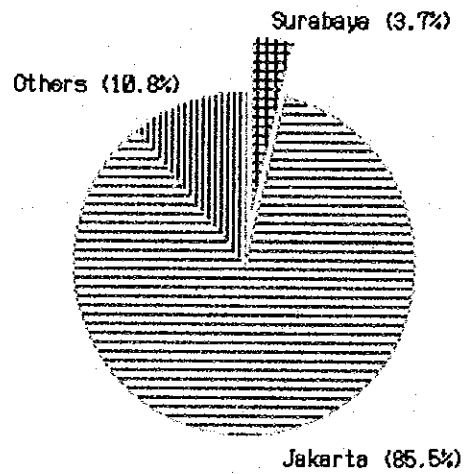
Telephone Service



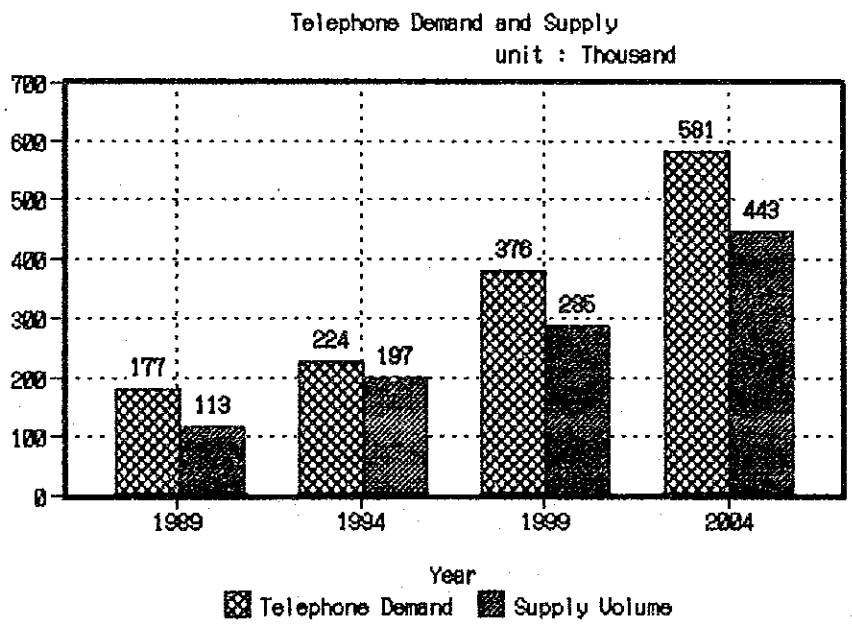
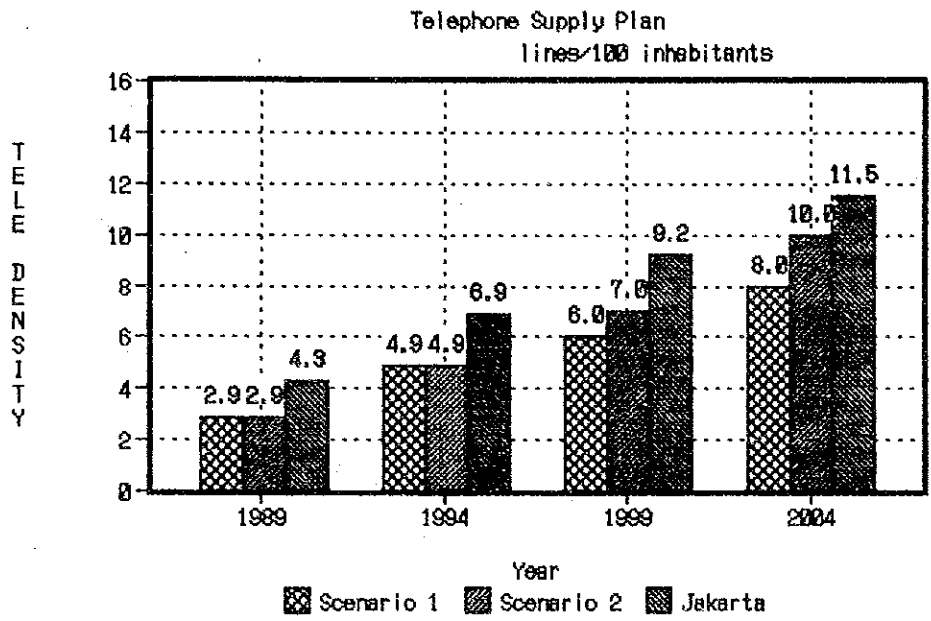
Telex Service



Data Communications



Present Conditions of Telecommunications Services
Share of Subscribers in each Service



Present Conditions of Telecommunications Services
Share of Subscribers in each Service

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ACRONYMS AND INITIALS

POSTEL	: Directorate General of Posts and Telecommunications
PERUMTEL	: PURUSAHAAN UMUM TELEKOMUNIKASI (Telecommunication Common Carrier in Indonesia)
WITEL	: WILAYAH USAHA TELEKOMUNIKASI (Regional Bureau of PERUMTEL)
BAPPEDA	: BADAN PERENCANAAN PEMBANGUNAN DAERAH (Regional Planning Board)
BKPM	: BADAN KOORDINASI PENANAMAN MODAL DAERAH (Regional Investment Coordination Board)
BPN	: BADAN PERTANAHAN NASIONAL (Land National Board)
BPS	: BIRO PUSAT STATISTIK (Statistic Central Bureau)
JICA	: Japan International Cooperation Agency
REPELITA	: Five-Year National Development Plan
Kotamadya	: Municipality
Kabupaten	: Regency
Kecamatan	: Sub District
Desa	: Village
TC	: Tertiary Center
SC	: Secondary Center
PC	: Primary Center
LE	: Local Exchange
STDI	: SENTRAL TELEPON DIGITAL INDONESIA (Digital Switching Equipment in Indonesia)
M.E.A.	: Multi-Exchange Area
MAS	: Multi-Access Subscriber System
DAMA	: Demand Assigned Multiple Access
SKDP	: SAMBUNGAN KOMUNIKASI DATA PAKET (Packet Switched Public Data Network in Indonesia)

VSAT : Very Small Aperture Terminals
MHS : Message Handling System
IDN : Integrated Digital Network
ISDN : Integrated Services Digital Network
GRDP : Gross Regional Domestic Product
FIRR : Financial Internal Rate of Return
EIRR : Economic Internal Rate of Return

LIST OF EXCHANGES AND STATIONS

Surabaya Multi-Exchange Area

BBE : Bambe
 DMO : Darmo
 GS : Gresik
 IJK : Injoko
 KBL : Kebalen
 KDN : Kandangan
 KJR : Kenjeran
 KLK : Kalianak
 KML : Kamal
 KPL : Karang Pilang
 KPS : Kapasan
 MGO : Mergoyoso
 MNI : Menganti(*)
 MNR : Manyar
 PRK : Tj. Perak
 RKT-I : Rungkut-I
 RKT-II: Rungkut-II (Jagir)
 SB-I : Surabaya-I (Transmission)
 SB-II : Surabaya-II (- ditto -)
 SDA : Sidoarjo
 SPJ : Sepanjang
 TDS : Tandes
 WRU-I : Waru-I
 WRU-II: Waru-II
 PR : Porong(*)

Surabaya Message Area

BKL : Bangkalan
 CME : Cerme
 KRN : Krian
 SDY : Sedayu(*)

Mojokerto Message Area

JG : Jombang
 MOJ : Mojoagung
 MR : Mojokerto
 MJS : Mojosari
 POS : Ploso

Lamongan Message Area

BBT : Babat
 LMG : Lamongan

Note (*) : proposed new location

REFERENCES

- (1) Statistical Year Book of Indonesia 1988, Biro Pusat Statistik
- (2) Produk Domestik Regional Bruto 1983 - 1986, Regional Planning Board (Bappeda) of East Jawa and Statistic Office of East Jawa
- (3) Indonesia, Country Profile 1989 - 90, The Economist Intelligence Unit
- (4) Urban Development Planning Study on GERBANGKERTOSUSILA Region, JICA 1983
- (5) Rencana Umum Tata Ruang Wilayah, GERBANGKERTOSUSILA (GERBANGKERTOSUSILA General Spatial Plan), Bappeda and ITS 1987
- (6) Rencana Pembangunan Lima Tahun V (REPELITA V), Jawa Timur (The Fifth Five Year Plan, East Jawa), East Jawa Government 1989
- (7) Tata Ruang Jawa Timur, 2008 (East Jawa Spatial Plan, 2008), East Jawa Government
- (8) Long Term Planning for Development of Telecommunications System, JICA 1987
- (9) Fundamental Study on Rural Telecommunications Network, JICA 1985
- (10) Long-Term and Medium-Term Plan for Telecommunications Network in JABOTABEK Area, JICA 1989
- (11) Basic Design Reports, PMC Option Services 1988
- (12) Fundamental Technical Plan, POSTEL 1986
- (13) Strategic Development Plan, POSTEL 1986
- (14) Strategic Development Plan for Data Communications, POSTEL 1988
- (15) Bidding Documents of TELECOM III OSP Project, PERUMTEL 1990
- (16) GAS 3 Handbook, "General Network Planning", CCITT 1983
- (17) GAS 10 Handbook, "Planning Data and Forecasting Methods - Case Study", CCITT 1987
- (18) GAS 11 Handbook, "Strategy for the Introduction of a Public Data Network in Developing Countries", CCITT 1987

SECTION 1 INTRODUCTION

SECTION 1

INTRODUCTION

1.1 Background of the Study

Surabaya is the second largest city in Indonesia and the center of East Java in the fields of commerce, finance, industry and so on. The recent development of socio-economic activities in Surabaya city has been expanding toward its surrounding areas and various kinds of development programs are planned and under implementation.

Under the above circumstances, demands for telecommunications services in these areas are rapidly increasing, with increasing number of waiting applicants. To further encourage the socio-economic activities in these areas and to realize the regional development programs as planned, these demands must be satisfied urgently.

In view of the above, the Government of Indonesia intended to draw up a long-term and medium-term telecommunications network improvement plan up to the year 2004 for these areas, in line with the regional development program, and requested the assistance of the Government of Japan.

In response to this request, the Government of Japan entrusted the study of the long-term and medium-term plan for telecommunications network to Japan International Cooperation Agency (hereinafter referred to as "JICA"). JICA dispatched a preliminary study team to Indonesia from May to June 1989. The preliminary study team proposed the scope of work to be undertaken by the JICA Study Team, and after discussion with the officials concerned of the Government of Indonesia, the proposed scope of work was agreed upon by both parties.

The main studies were carried out by the JICA Study Team, based on the scope of work thus defined, as follows:

- Preliminary study in Japan : Sep. - Oct. 1989
- Study in Indonesia (1) : Oct. 1989 - Feb. 1990
- Study in Japan (1) : Feb. - Mar. 1990
Jun. - Jul. 1990
- Study in Indonesia (2) : Jul. - Sep. 1990
- Study in Japan (2) : Sep. - Nov. 1990

1.2 Objective of the Study

The objective of the study is to prepare a regional telecommunications network plan up to the year 2004, in line with the regional development plan in Surabaya and surrounding areas, comprising:

- Long-term Plan : up to the end of Repelita VII (2004)
- Medium-term Plan : up to the end of Repelita VI (1999)
- Implementation Program
of Essential Project : during Repelita V and VI

Focus is placed on the formulation of a plan for telecommunications network well coordinated with the socio-economy and regional development framework in the area.

1.3 Study Area/Planning Area

The Study Area consists of 6 administrative areas, i.e., the area centered by Surabaya and surrounded by Gresik, Bangkalan, Mojokerto, Sidoarjo and Lamongan (hereinafter called "GERBANGKERTOSUSILA" or "GKS"). In planning, Jombang area (Kabupaten Jombang) is also included in the objective area, considering the present telecommunications network configuration of the area. Accordingly, following is defined:

- Study Area : GERBANGKERTOSUSILA (or GKS)
- Planning Area : GERBANGKERTOSUSILA (or GKS) and Kabupaten JOMBANG (Objective area)

Objective area is illustrated in Figure 1.1.

1.4 Method of Approach and Schedule of the Study

The Study is made, based on the major findings during the field study in Indonesia and the mutual understandings reached through the discussion between POSTEL/PERUMTEL and the JICA Study Team during the study period. The work flow covering the whole study is shown in Figure 1.2.

Main subjects of the study are set as follows:

- to formulate the regional development framework,
- to establish the development target for telecommunications network up to the year 2004 and to examine development strategies,
- to formulate long-term and medium-term plan in dimensioning the network scale and facilities required, and
- to select and evaluate an essential project to be implemented during Repelita V and VI and prepare the implementation program of the project.

The schedule and major items of the Study appear in Figure 1.3.

1.5 Organization

1.5.1 Japanese Team

(1) Preliminary Study Team (From 24 May to 2 June, 1989)

Mr. Satoru ITOH : Team Leader
Mr. Akira MIZOBUCHI : Member
Mr. Shunsuke NOGUCHI : Member
Mr. Shigemaro AOKI : Member
Mr. Hiroshi TAKAOKA : Member
Mr. Takao SAKAGAMI : Member

(2) Main Study Team

Mr. Satoru KUSHIDA : Team Leader (Transmission)
Mr. Tatsumi Amano : Network Planning/Demand Study
Mr. Yoichi MISHIMA : Switching System
Mr. Yoshiaki KOBAYASHI : Junction Network (Outside Plant)
Mr. Takashi SUZUKI : Radio and Transmission System
Mr. Shin-ichi AOKI : New Services (until March 1990)
Mr. Tatsuo SEKI : Subscribers Network (from July 1990)
Mr. Haruo YAMANE : Regional Development Planning and
financial analysis
Dr.Ir. Agus Mulyanto : Regional Development Planning
(Local Consultant) (until February 1990)

(3) JICA Advisory Committee

Mr. Katsuharu NAKAMURA : Chairman/Ministry of Posts and
Telecommunications
(until June 1990)
Mr. Takayuki SUZUKI : Chairman/Ministry of Posts and
Telecommunications
(from July 1990)
Mr. Takashi SUGAWARA : Member/ditto
Mr. Shigemaro AOKI : Member/JICA
Mr. Kiyoshi NORITAKE : Member/JICA (from July 1990)

1.5.2 Indonesian Members

Directorate General of Posts and Telecommunications (hereinafter referred to as "POSTEL") acts as the counterpart to the JICA Study Team and also as the coordinating body to the relevant organizations for the execution of the Study. POSTEL assigned counterpart engineers from PERUMTEL as shown below:

Mr. Suwandi Bc.TT	: DITOPTEK (Coordinator) (until February 1990)
Ir. Angger Pramunditto	: BINPROSIS (Secretary, Network Planning) (until February 1990)
Mr. Undang Sudirman	: - ditto - (from July 1990)
Ir. Mas Budiwasisto	: - ditto - (from July 1990)
Mr. Utang Supriatna BE	: PUSRENLITBAN (Regional Development) (until February 1990)
Mr. I.G.KD. Bambang	: - ditto - (from July 1990)
Mr. Suyanto	: BINPROSEN (Switching System)
Ir. Budhi Santoso	: BINPROTRA (Transmission System) (until February 1990)
Mr. Riadmadi Basutoro	: - ditto - (from July 1990)
Mr. Moch Iqbal	: BINPROJAR (Outside Plant) (until February 1990)
Mr. Hassan Ibrahim	: - ditto - (from July 1990)
Mr. Tumio	: TEKSEN (New Services) (from July 1990)
Ir. Arief Noormudia	: WITEL VII (Switching System) (until February 1990)
Mr. Agus Saptadi	: " (Transmission System)
Mr. Agung Yudanto	: " (New Services)
Mr. Yayat Hidiyat	: " (Outside Plant) (until February 1990)
Mr. Slamet Santoso	: " (Network Planning)
Ir. Syailendra	: " (Network Planning) (from July 1990)
Ir. Ben Aron F.S.	: " (Network Planning) (from July 1990)

The counterpart officials above have greatly contributed to the satisfactory completion of the field survey and study work.

During the second study period in Japan, two counterparts from Indonesia were dispatched to Japan to receive a training course conducted by JICA as the technology transfer for the study. The name of counterparts and period of training are as follows:

- Name of Counterparts:

Ir. Mas Budiwasisto	from BINPROSIS, PERUMTEL H/Q Bandung
Ir. Syailendra	from WITEL VII, PERUMTEL Surabaya

- Training Period:

25 September - 31 October 1990 (37 days)

Other persons from organizations concerned have also extended their cooperation to the Study Team for data collection, valuable suggestions and so on. The list of these persons is given in ANNEX 1.

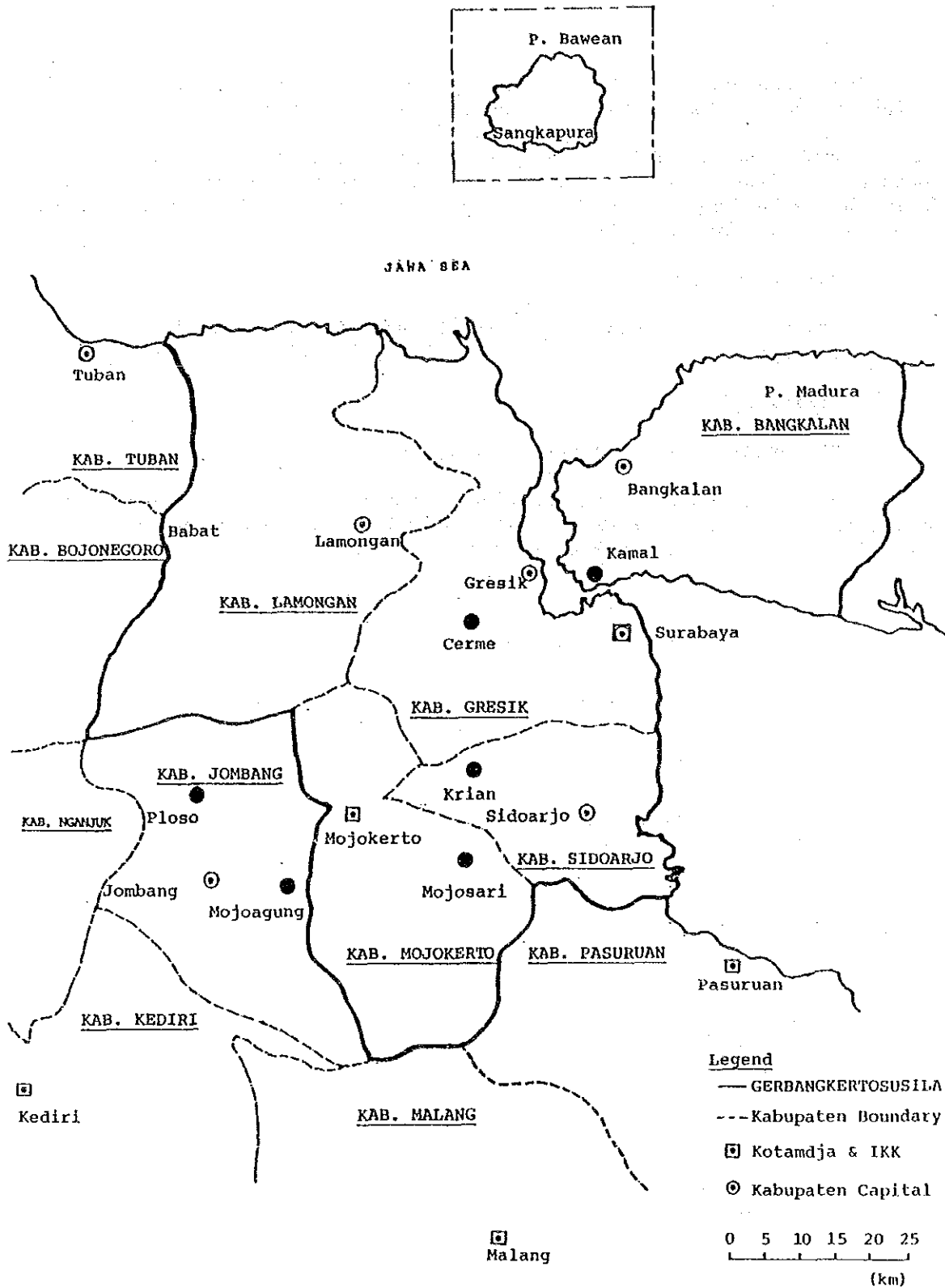


Figure 1.1 The Objective Area

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Figure 1.2 Study Flow

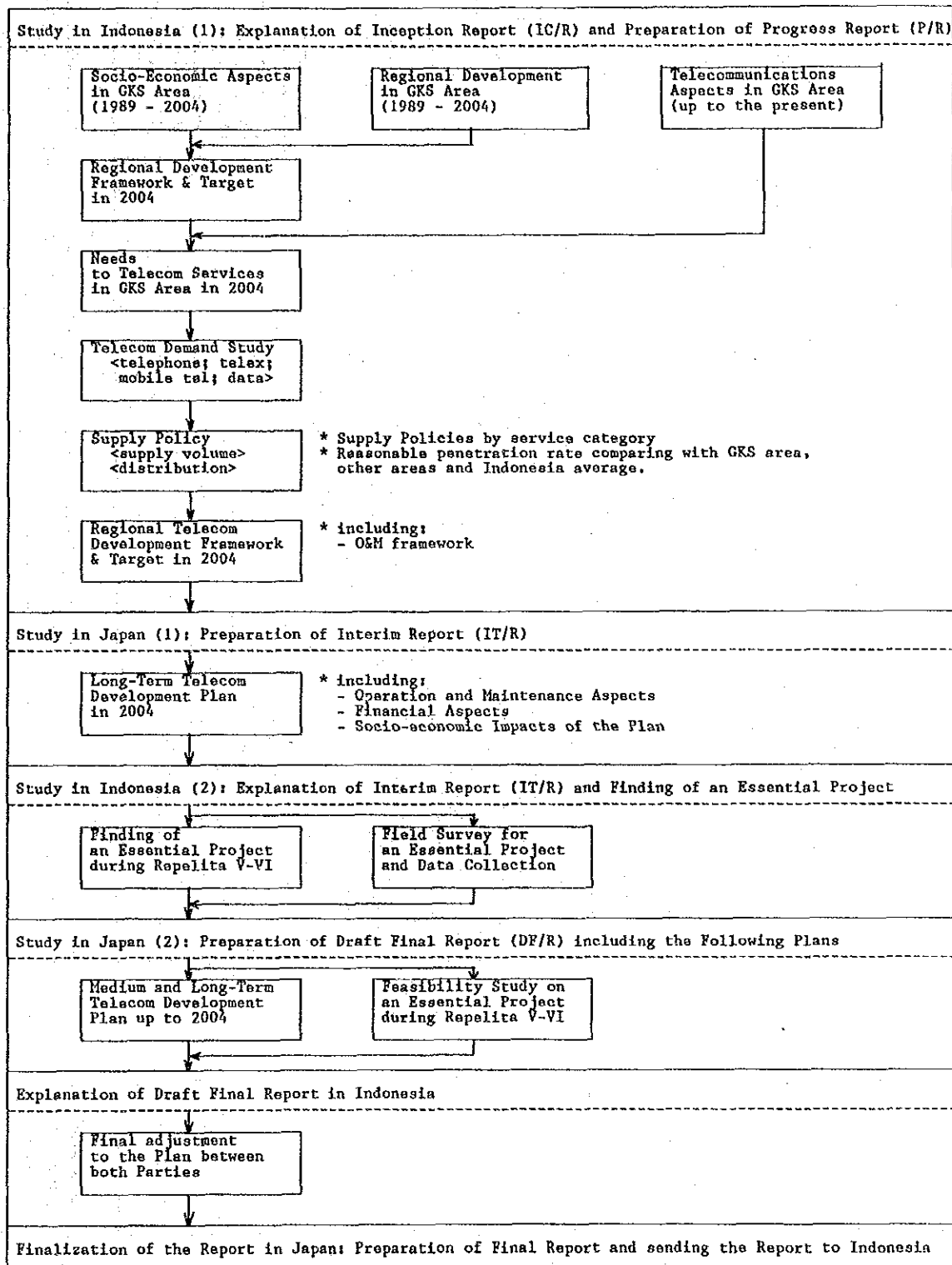
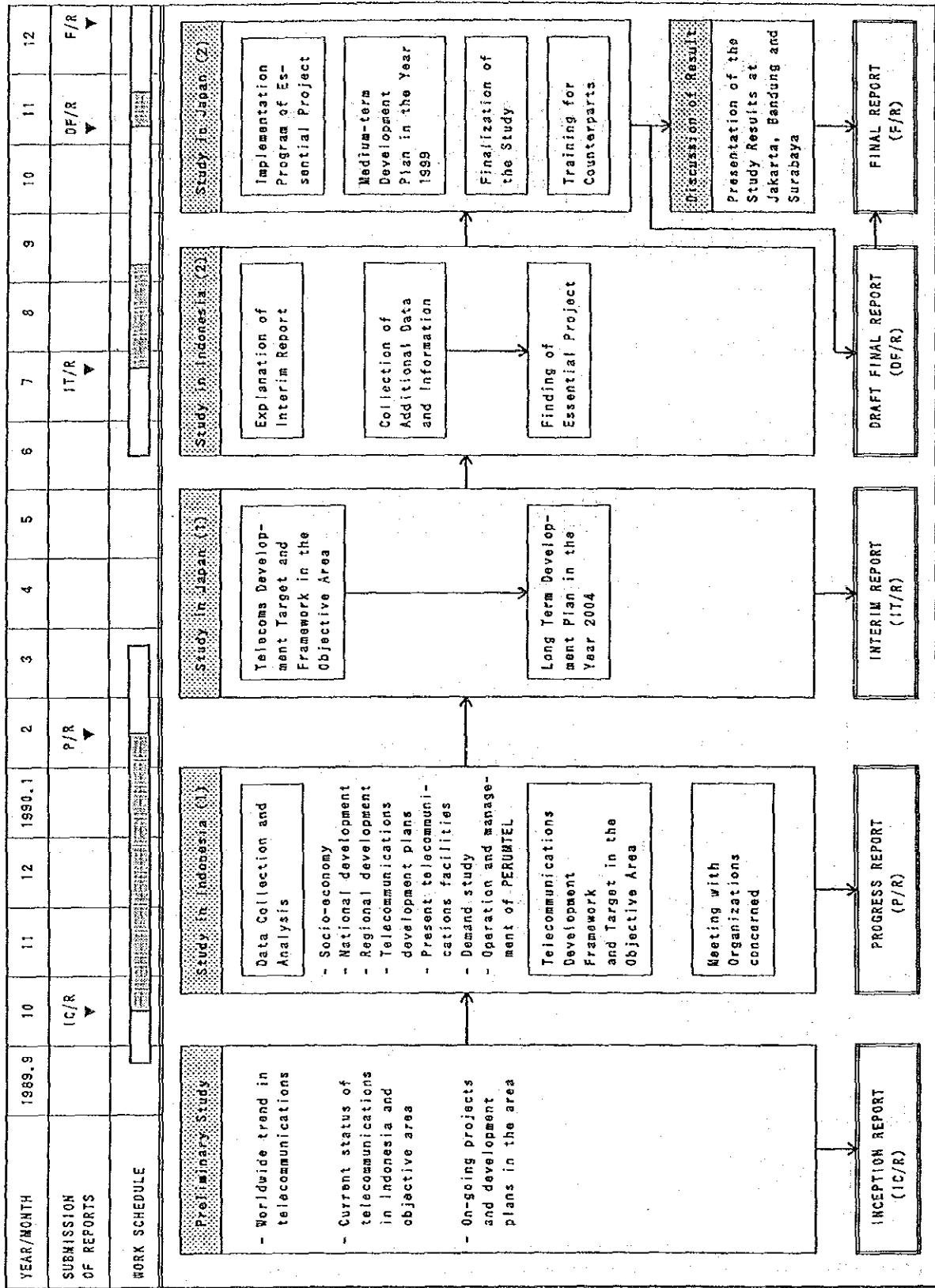


Figure 1.3 OVERALL SCHEDULE OF THE STUDY



SECTION 2 REGIONAL DEVELOPMENT FRAMEWORK

SECTION 2

REGIONAL DEVELOPMENT FRAMEWORK

2.1 Objectives

The objectives of formulating the regional development framework are as follows:

- to analyze the present conditions of the Study Area in socio-economy and spatial development patterns to formulate the framework for establishing telecommunications development policies and strategies
- to make a projection of economic growth and population for the target years (1994, 1999 and 2004) to formulate the framework for a telecommunications demand projection
- to make a projection of the number of factories to locate in planned industrial estates as the basic data for showing a model case of telecommunications development planning for industrial demand

The following aspects were analyzed for formulating the regional development framework.

Present conditions in the study area

- Socio-economy
 - . Population
 - . GRDP
- Spatial development patterns
 - . Land use and urbanization
 - . Investment location
 - . Traffic flow

Regional development framework

- Existing development plans
- Development policies and strategies
 - . Development policies of East Java Government
 - . Development potentials
 - . Prospect of major transportation projects
- Industrial development directions until 2004
- Regional development framework
 - . Population
 - . GRDP
 - . GRDP per capita
 - . Number of factories in the industrial estate

2.2 Present Conditions in the Study Area

2.2.1 Study Area

(1) Role of GKS Region

Population in Surabaya numbered about 2.34 million in 1985, the second largest in Indonesia after DKI Jakarta. GERBANGKERTOSUSILA (or GKS), composed of Surabaya and the surrounding 6 kabupatens and kotamadyas, was inhabited by a population of 6.8 million in 1985 and covers the land area of 6,006 square kilometers, accounting for 4.2% and 0.3% of Indonesia's population and land area respectively.

The Surabaya area functions as an important regional center in the East Java Province and the eastern part of Indonesia in a number of aspects. As the capital city of the East Java Province, the provincial government in Surabaya supervises and coordinates administrative and development issues in the province. In terms of economic activities, Surabaya and surrounding areas function as a major center of manufacturing production and financial and commercial transactions in East Java and for other parts of eastern Indonesia including Bali, Nusa Tenggara, Kalimantan, Sulawesi and Irian Jaya.

The Surabaya area is also the hub of the land transportation network in East Java and the gateway to other areas for air and sea transportation. The Tanjung Perak port in Surabaya handled about 12 million tons of cargoes including international and inter-island cargoes in 1987, reflecting a large volume of commodities transported through Surabaya. The Juanda airport in Sidoarjo, located to the south of Surabaya, functions as an important gateway for domestic air traffic. The total number of passengers departing and arriving at the Juanda airport amounted to nearly 1.6 million in 1986 accounting for 11% of the total number of air passengers in Indonesia. Currently construction works are going on at the Tanjung Perak port to enhance container handling capacity of the port. The Juanda airport is planned to turn into an international airport in 1990. These developments would result in reinforcing the GKS's role as the hub of sea and air transportation in the region. Cargo handling volumes at the Tanjung Perak port and air traffic at the Juanda airport are presented in Tables 2.2.1 and 2.2.2.

GKS region is endowed with a number of favorable conditions for development such as follows:

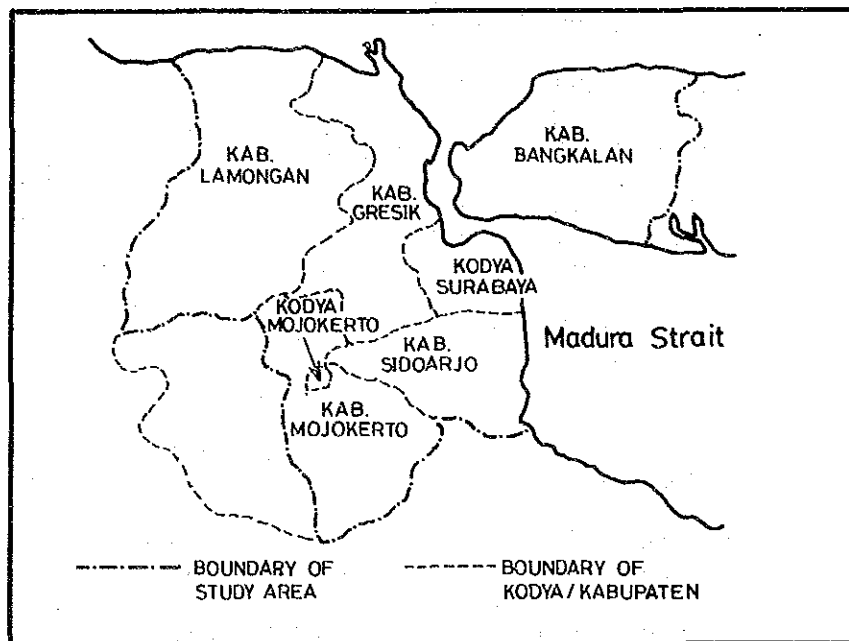
- a complete set of relatively well-developed transportation systems and infrastructure facilities
- rich natural resources, such as
 - agriculture products
 - mineral resources
 - water resources
- availability of hard-working manpower and laborforce
- availability of a huge hinterland suitable for non-agriculture growth

By exploring and taking advantage of these growth potentials, Surabaya and surrounding areas are expected to lead the economic growth of

East Jawa and eastern Indonesia and contribute to the national economic growth of Indonesia in the coming years.

(2) Administrative Structure and Boundaries

The study area is basically GERBANGKERTOSUSILA comprising five kabupatens (regency) and two kotamadyas (municipality). Kabupaten Jombang is also to be studied to some extent. Their boundaries are shown below.



Each kabupaten (kab) and kotamadya (kodya) is composed of the following number of kecamatan:

<u>Kab/Kodya</u>	<u>Number of kecamatan</u>
Kab.Gresik	18
Kab.Bangkalan	18
Kab.Mojokerto	17
Kodya Mojokerto	2
Kodya Surabaya	19
Kab.Sidoarjo	18
Kab.Lamongan	22
Kab.Jombang	20
<hr/>	
Total	134

The boundaries and names of kecamatan in the objective area are shown in Figure 2.2.1. Kecamatan boundaries in Kodya Surabaya are shown in Figure 2.2.2.

Table 2.2.1 Air Traffic at Juanda
Airport and In Indonesia
in 1986

(Unit : thousands)

Category	Juanda	Indo-	(1)/(2)
	Airport	nesia	(%)
	(1)	(2)	
(Number of Passenger)			
Arrival	708	7,117	9.9
Departure	826	6,804	12.1
Transit	64	944	6.8
Total	1,598	14,865	10.8
(Number of Aircraft)			
Arrival	18	261	6.9
Departure	18	261	6.9
Total	36	522	6.9

Source :

(1) Jawa Timur dalam Angka, 1987

(2) Statistik Indonesia, 1988

Table 2.2.2 Cargo Handling Volume at Tj. Perak and Other Major Ports
in Indonesia in 1987

Port	International			Inter-island			Total
	Loaded	Unloaded	Total	Loaded	Unloaded	Total	
(Cargo Volume in thousand tons)							
Tanjung Perak	1,693	2,377	4,070	2,088	5,759	7,847	11,917
Tanjung Priok	3,159	5,826	8,985	2,438	8,186	10,624	19,609
Belawan	1,877	879	2,756	864	2,124	2,988	5,744
Ujung Pandang	318	368	686	930	2,059	2,989	3,675
TOTAL	7,047	9,450	16,497	6,320	18,128	24,448	40,945
(% Structure at each Port)							
Tanjung Perak	14.2	19.9	34.2	17.5	48.3	65.8	100.0
Tanjung Priok	16.1	29.7	45.8	12.4	41.7	54.2	100.0
Belawan	32.7	15.3	48.0	15.0	37.0	52.0	100.0
Ujung Pandang	8.7	10.0	18.7	25.3	56.0	81.3	100.0
TOTAL	17.2	23.1	40.3	15.4	44.3	59.7	100.0
(% Structure of All Ports)							
Tanjung Perak	24.0	25.2	24.7	33.0	31.8	32.1	29.1
Tanjung Priok	44.8	61.7	54.5	38.6	45.2	43.5	47.9
Belawan	26.6	9.3	16.7	13.7	11.7	12.2	14.0
Ujung Pandang	4.5	3.9	4.2	14.7	11.4	12.2	9.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source : Investment Map of East Jawa, 1989

East Jawa Regional Investment Coordination Board

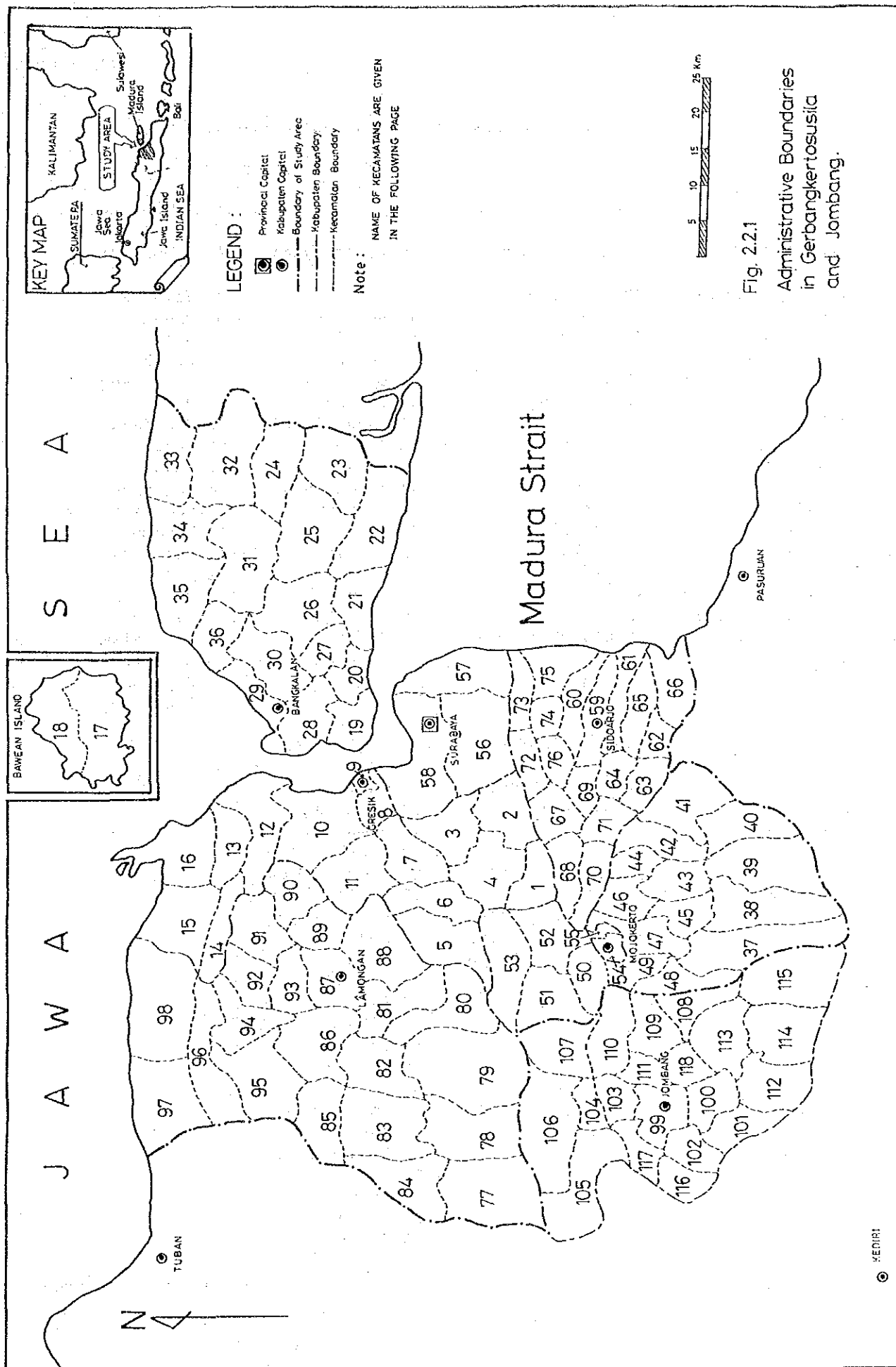


Fig. 2.2.1
Administrative Boundaries
in Gerbangkertosusila
and Jombang.

List of Kecamatan in the Objective Area

(KAB. GRESIK)	(KAB. MOJOKERTO)	(KAB. SIDOARJO)	(KAB. JOMBANG)
1 Wringinanom	37 Jatirejo	59 Sidoarjo	99 Jombang
2 Driyorejo	38 Gondang	60 Buduran	100 Diwek
3 Menganti	39 Pacet	61 Candi	101 Gudo
4 Kedamean	40 Trawas	62 Porong	102 Perak
5 Balongpanggang	41 Ngoro	63 Krembung	103 Tembelang
6 Benjeng	42 Pungging	64 Tulangan	104 Ploso
7 Cerme	43 Kutorejo	65 Tanggulangin	105 Plandaan
8 Kebomas	44 Mojosari	66 Jabon	106 Kabuh
9 Gresik	45 Dlanggu	67 Krian	107 Kudu
10 Manyar	46 Bangsal	68 Balongbendo	108 Mojoagung
11 Duduk Sampeyan	47 Puri	69 Wonoayu	109 Sumobito
12 Bungah	48 Trowulan	70 Tarik	110 Kesamben
13 Sedayu	49 Sooko	71 Prambon	111 Peterongan
14 Dukun	50 Gedek	72 Taman	112 Ngoro
15 Panceng	51 Kemlagi	73 Waru	113 Mojowarno
16 Ujung Pangkah	52 Jetis	74 Gedangan	114 Bareng
17 Sangkapura	53 Dawarblandong	75 Sedati	115 Wonosalam
18 Tambak		76 Sukodono	116 Bandarkedung M
			117 Megaluh
			118 Jogorogo
(KAB. BANGKALAN)	(KODYA MOJOKERTO)	(KAB. LAMONGAN)	
19 Kamal	54 Prajurit Kulon	77 Bluluk	
20 Labang	55 Magersari	78 Ngimbang	
21 Kwanyar		79 Sambeng	
22 Modung		80 Mantup	
23 Blega	(KODYA SURABAYA)	81 Kembang Bahu	
24 Konang		82 Sugio	
25 Galis	56 Surabaya Selatan	83 Kedung Pring	
26 Tanah Merah	57 Surabaya Timur	84 Modo	
27 Tragah	58 Surabaya Utara	85 Babat	
28 Socah		86 Sukodadi	
29 Bangkalan		87 Lamongan	
30 Burneh		88 Tikung	
31 Geger		89 Deket	
32 Kokop		90 Glagah	
33 Tanjung Bumi		91 Karang Binangun	
34 Sepulu		92 Kali Tengah	
35 Klampis		93 Turi	
36 Arosbaya		94 Karang Geneng	
		95 Sekaran	
		96 Laren	
		97 Brondong	
		98 Paciran	

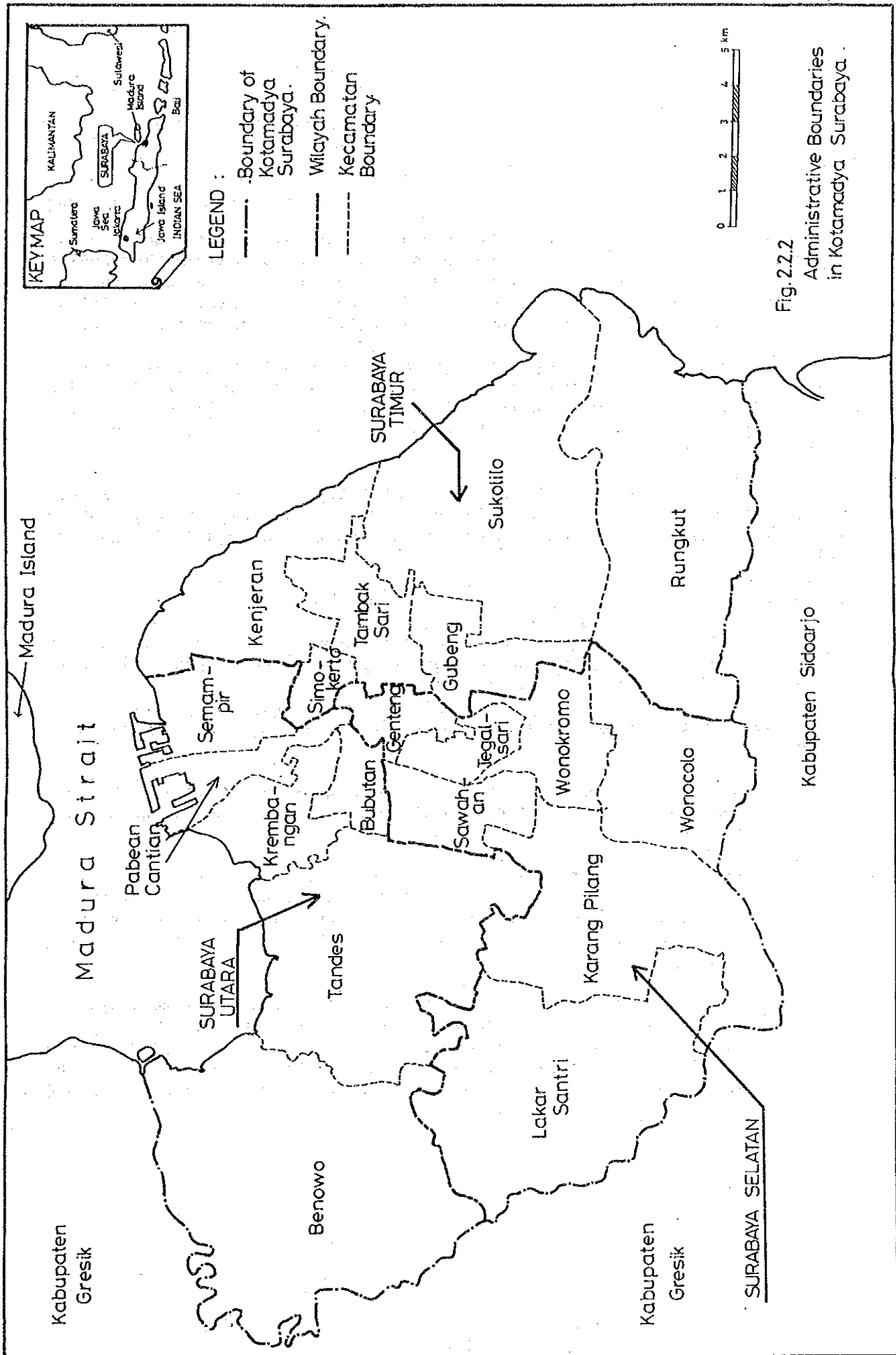


Fig. 2.2.2
Administrative Boundaries
in Kotamadya Surabaya

2.2.2 Socio-Economy

(1) Population

1) General

Table 2.2.3 presents the population, annual growth rates and the proportions of each area to Indonesia, East Jawa and GERBANGKERTOSUSILA (GKS) Area. The figures were prepared based on the data from censuses and supas 1985. The population of GKS Area in 1985 numbered about 6.8 million accounting for 22 % of the East Jawa total and 4.2 % of the national total.

Between 1980 and 1985, the population of GKS Area grew at the same rate as the national growth rate (2.15 % for national and 2.16 % for GKS Area). During the same period, GKS's population grew faster than East Jawa's population (1.38 % for East Jawa), indicating the inflow of population into GKS Area.

In the Study Area, Kodya Surabaya and Kabupaten Sidoarjo experienced the highest population growth (2.9 % and 2.7 % per year respectively), while Kabupaten Bangkalan had the lowest population growth (0.8 %) in the same period.

2) Population Density

Figure 2.2.3 presents population densities of the kecamatans in the objective area in 1988 prepared based on the registered population data obtained from BPS (Central Statistic Office).

The major characteristics in population density are summarized as follows :

- Central part of Kodya Surabaya and Kecamatan Gresik are the most densely populated areas with more than 7,000 people per square kilometer.
- Areas with moderate population densities (2,000 - 7,000 population per square kilometer) are found in the western, eastern, and southern parts of Surabaya, some kecamatans in Sidoarjo bordering Surabaya, Kodya Mojokerto, and Kecamatan Jombang.
- Overall, the southern part of the objective area is more densely populated than the northern part. Along Jombang - Mojokerto - Sidoarjo axis, population densities fall under 1,000 - 2,000 people per square kilometer range. Most kecamatans in the northern part have a lower population density, less than 1,000 people per square kilometer.

3) Population Growth

Figure 2.2.4 shows the population growth rates of each kecamatan in the objective area between 1983 and 1988 prepared based on registered population data obtained from BPS.

The major characteristics in population growth are summarized as follows :

- Rapid population growth is observed in eastern and western peripheral areas in Kodya Surabaya, some northern kecamatans in Sidoarjo bordering Surabaya and a kecamatan in Gresik bordering Surabaya. Especially, Kecamatan Lakarsantri and Rungkut in Kodya Surabaya showed a rapid growth with annual growth rates registering higher than 6.0% per year. Kecamatan Waru in Sidoarjo also showed a remarkably high growth (7.6% per year).
- The central parts of Kodya Surabaya showed a zero or minus population growth. This indicates central Surabaya has been transforming into a business and commercial center and part of the population has moved out to surrounding areas.
- Many kecamatans in Bangkalan, especially those in the southern coastal area, experienced quite low or even a minus population growth. Low agriculture productivity and lack of job opportunities in these areas have likely resulted in outmigration of the population leading to low or negative growth rates.
- Much of the areas extending from central Lamongan to northern Jombang and Mojokerto have moderate population growth rates in the range of 1 % to 2 % per year.

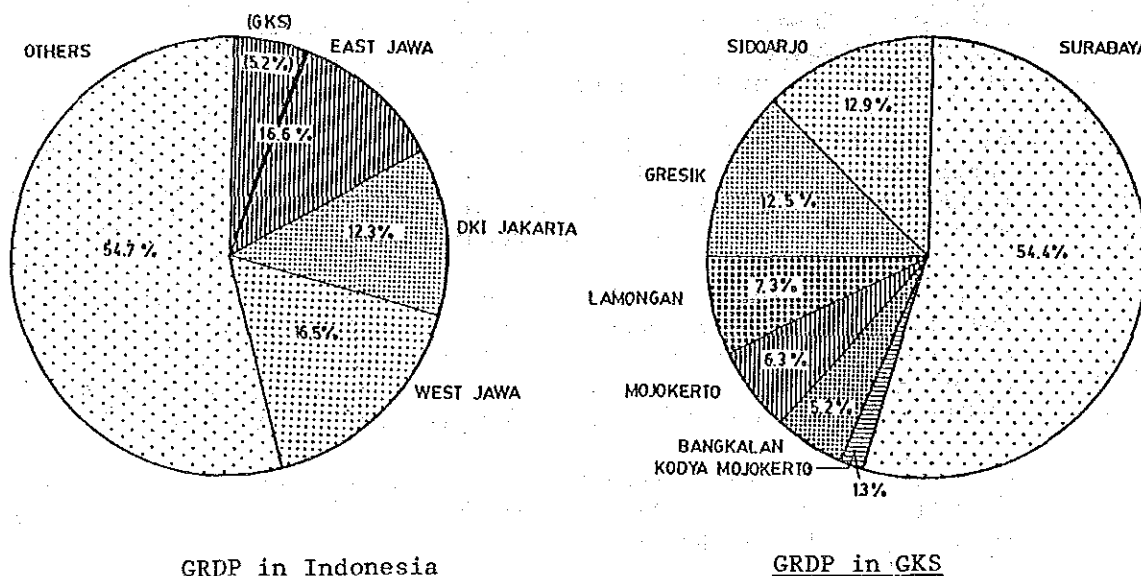
Annex 2.1 presents the registered population, growth rates and population densities by kecamatan in the objective area.

(2) Gross Regional Domestic Product (GRDP)

1) General

GRDP in GKS amounted to Rp. 5,023 billion in 1986 in current market price accounting for about one third (32.8%) of East Jawa's GRDP, or 5% of the Indonesian total as shown below and in Table 2.2.4.

In GKS Area, Kodya Surabaya produces the majority (54.4%) of GRDP produced in GKS. Kabupaten Sidoarjo and Gresik follow Surabaya, each accounting for nearly 13% of GRDP in GKS. Another four areas play smaller roles in the size of economic activities.



2) GRDP Growth Rate

Table 2.2.5 summarizes the GRDP growth rate of the objective area, East Jawa and Indonesia.

GKS Area experienced higher economic growth rate (6.5%) than East Jawa (5.0%) and Indonesia (3.8%) between 1980 and 1986.

In the objective area, northern part of the objective area such as Kodya Surabaya, Kab.Gresik, Kab.Lamongan and Kab.Bangkalan and Kodya Mojokerto experienced higher economic growth rates than the East Jawa average (7%, 6.3%, 6.7%, 7.8% and 8.2% per year respectively, compared to 5.0% for East Jawa).

The following sectors contributed most to the fast growth of GRDP in these areas.

Surabaya : transportation and communications
 bank and other financial intermediaries
 real estate transactions

Gresik : manufacturing
 : transportation and communications
Lamongan : agriculture
Bangkalan : agriculture
Kodya Mojokerto : electricity, gas and water supply
 : transportation and communications

The southern part of the objective area including Kab.Sidoarjo, Kab.Mojokerto, and Kab.Jombang, on the contrary, grew slower than East Jawa (4.9%, 3.6%, and 4.8% respectively).

3) GRDP Structure

In terms of GRDP structure, as shown in Figure 2.2.5, the objective area can be divided into the following four types.

- a) Surabaya and Kodya Mojokerto :
Tertiary sector 1 plays the dominant role.
- b) Gresik and Sidoarjo :
The secondary sector, especially the manufacturing sector, plays an important role.
- c) Kab.Mojokerto and Jombang
Relatively high proportions of the primary sector and the tertiary sector, especially commerce and services, are observed.
- d) Bangkalan and Lamongan :
The primary sector accounts for the majority of GRDP.

The major characteristics of GRDP structure in GKS are summarized as follows :

- Surabaya plays the dominant role in the tertiary sector (71%).
- Bangkalan and Lamongan constitute about a half of total GRDP in the primary sector.
- Surabaya, Gresik, and Sidoarjo combined together, constitute most of GRDP (90%) in the secondary sector (43%, 26%, and 21% respectively).
- Regarding the secondary sector, Surabaya, Gresik, and Sidoarjo combined account for most (95%) of the total GRDP in large and medium industries.

1 Primary sector : agriculture, fishery, forestry etc.
Secondary sector : mining & quarrying, manufacturing
Tertiary sector : electricity/gas/water supply, building/construction, trade/hotel/restaurant, transportation/communications, bank/other financial intermediaries, real estate transactions, government, services

Annex 2.2 presents GRDP in each Kabupaten and Kotamadya in 1986 in current market prices.

4) GRDP Per Capita

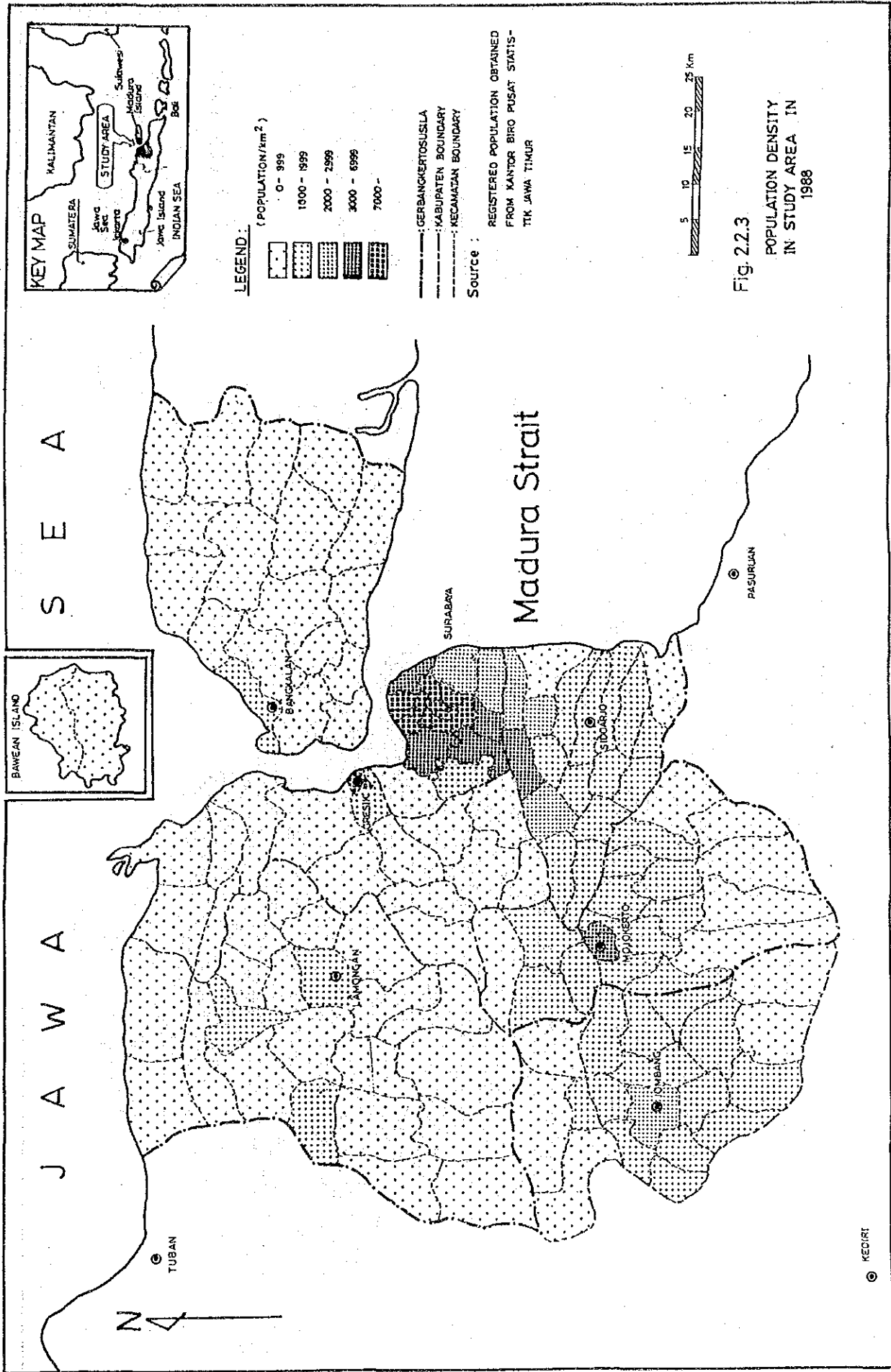
Table 2.2.6 shows GRDP per capita in East Jawa and the Study Area and their proportions to the national average in 1980 and 1985. GRDP per capita of GKS and East Jawa grew faster than GRDP per capita for Indonesia between 1980 and 1985 and gaps with the national average narrowed or reversed as summarized below.

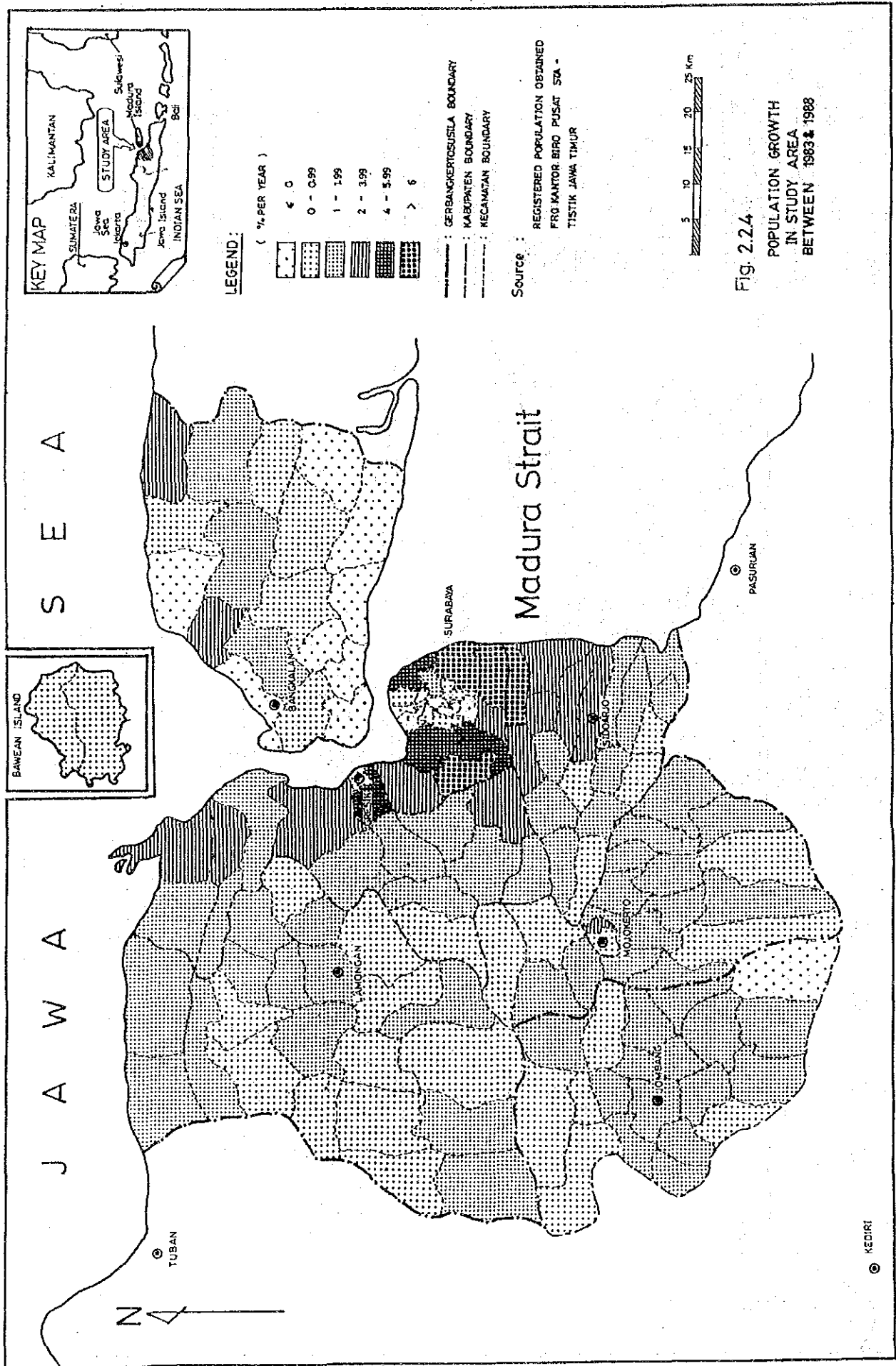
(Indonesia = 100)

Area	1980	1986
Indonesia	100	100
East Jawa	61	75
GKS	89	108

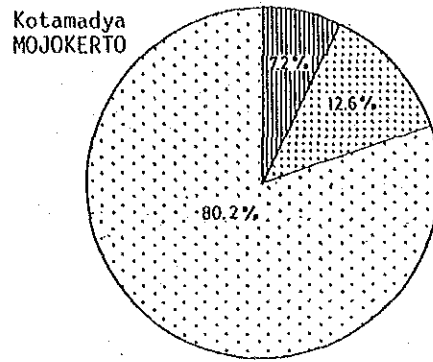
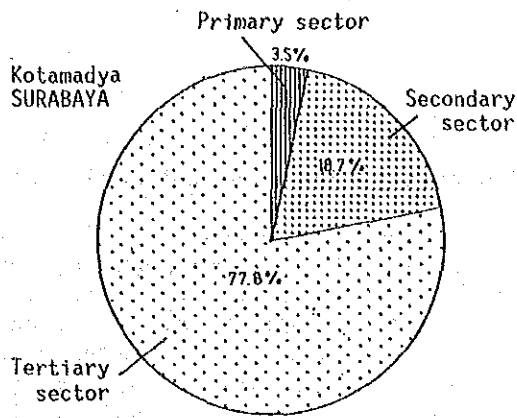
All kabupatens and kotamadyas in the objective area narrowed the gap with or surpassed the average GRDP per capita of Indonesia between 1980 and 1985.

The level of GRDP per capita in 1985 reflects GRDP structure of each kabupaten and kotamadya : the higher the proportions of the secondary and tertiary sectors, the larger the GRDP per capita. Surabaya stands out showing a GRDP per capita level of 172 relative to 100 for the national average. This is followed by Gresik, Sidoarjo and Kodya Mojokerto with slightly above 100. Other areas where the agricultural sector plays an important role show lower GRDP per capita levels ranging from 44 in Lamongan to 68 in Kabupaten Mojokerto.

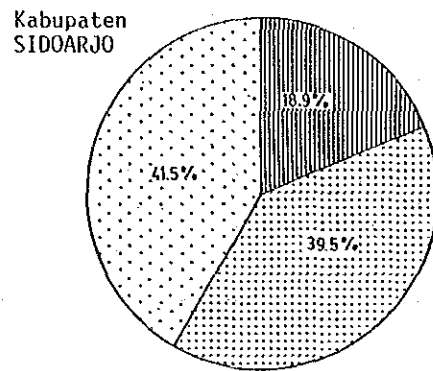
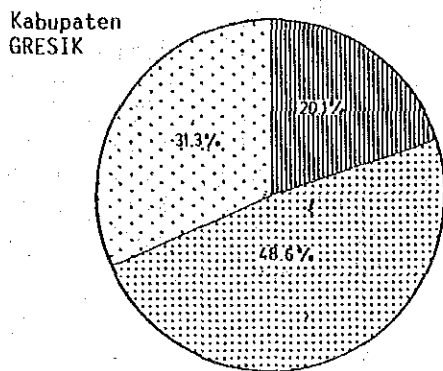




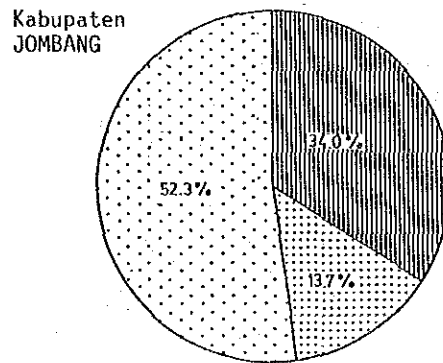
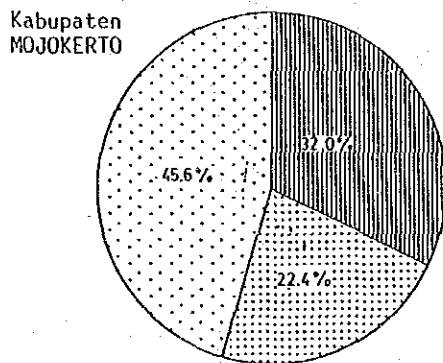
a) The tertiary sector is dominant.



b) The secondary sector plays the important role.



c) The primary and tertiary sectors are relatively high.



d) The primary sector is dominant.

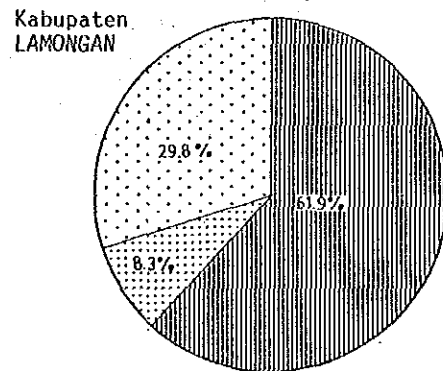
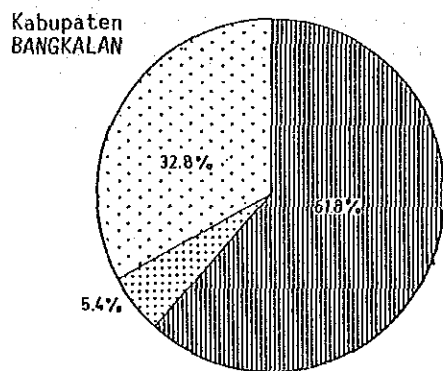


Figure 2.2.5 GRDP Structure of each Kabupaten and Kotamadya in Gerbangkertosusila and Jombang

Table 2.2.3 Population of Indonesia, East Jawa and Study Area

	Population (thousands)				Growth Rate (%/year)		
	1961	1971	1980	1985	61-71	71-80	80-85
Indonesia	97,085	119,208	147,490	164,047	2.07	2.39	2.15
Jawa	63,060	76,086	91,270	99,852	1.90	2.01	1.81
East Jawa	21,823	25,517	29,189	31,252	1.58	1.51	1.38
Gerbangkertosusila	4,108	5,042	6,124	6,814	2.07	2.18	2.16
Gresik	592	611	729	800	0.31	1.98	1.88
Bangkalan	574	631	688	717	0.95	0.96	0.83
Mojokerto (b)	494	596	706	757	1.89	1.89	1.42
Mojokerto (d)	52	60	69	92	1.50	1.54	5.96
(Kab & Kod Mojokerto)	546	656	774	849	1.85	1.86	1.86
Surabaya	1,165	1,566	2,028	2,340	3.00	2.91	2.91
Sidoarjo	457	663	854	976	3.85	2.78	2.69
Lamongan	773	909	1,050	1,131	1.64	1.61	1.50
Jombang	n.a.	812	942	1,017	n.a.	1.66	1.54
in %							
Jawa/Indonesia	65.0	63.8	61.9	60.9	-	-	-
East Jawa/Indonesia	22.5	21.4	19.8	19.1	-	-	-
Gerbangkertosusila	100.0	100.0	100.0	100.0	-	-	-
Gresik	14.4	12.1	11.9	11.7	-	-	-
Bangkalan	14.0	12.5	11.2	10.5	-	-	-
Mojokerto (b)	12.0	11.8	11.5	11.1	-	-	-
Mojokerto (d)	1.3	1.2	1.1	1.3	-	-	-
Surabaya	28.4	31.1	33.1	34.3	-	-	-
Sidoarjo	11.1	13.2	13.9	14.3	-	-	-
Lamongan	18.8	18.0	17.1	16.6	-	-	-

Source: - Population figures in 1961, 1971 and 1980 are from censuses.
 - Population figures in 1985 are from SUPAS 1985.

Note : - A big increase in Kodya Mojokerto's population in 1985 is largely due to the expansion of the boundary in 1983.
 - (b): Kabupaten
 (d): Kotamadya

Table 2.2.4 GRDP Distribution in 1986 (in current price)

(Unit: Million Rp.)

Area	GRDP in 1986 in Current Prices	%
Indonesia	95,823,100	100.0%
East Jawa	15,872,200	16.6%
DKI Jakarta	11,737,100	12.2%
West Jawa	15,767,200	16.5%
GKS	5,023,499	100.0%
Surabaya	2,734,597	54.4%
Sidoarjo	650,118	12.9%
Gresik	629,975	12.5%
Lamongan	364,847	7.3%
Kab. Mojokerto	318,485	6.3%
Bangkalan	260,587	5.2%
Kodya Mojokerto	64,890	1.3%
Jombang	345,185	-

Table 2.2.5 Growth Rate of GRDP in 1980 Price

(Unit: Million Rp.)

Area	1980	1986	%/year
Indonesia	66,675,000	83,318,000	3.8
East Jawa	5,889,074	7,898,644	5.0
GKS	1,798,748	2,617,950	6.5
Gresik	217,015	313,665	6.3
Bangkalan	93,052	145,805	7.8
Kab. Mojokerto	123,354	152,778	3.6
Kodya Mojokerto	20,279	32,597	8.2
Surabaya	961,465	1,441,929	7.0
Sidoarjo	249,590	333,127	4.9
Lamongan	133,992	198,049	6.7
Jombang	142,535	188,848	4.8

Table 2.2.6 GRDP per Capita in Current Prices

(Unit: thousand Rp.)

Area	1980		1986	
	GRDP/capita	Ind. = 100	GRDP/capita	Ind. = 100
Indonesia	332	100	577	100
East Jawa	202	61	430	75
GKS	294	89	624	108
Gresik	298	90	631	109
Bangkalan	135	41	283	49
Kab. Mojokerto	175	53	394	68
Kodya Mojokerto	295	89	608	105
Surabaya	474	143	994	172
Sidoarjo	292	88	589	102
Lamongan	128	39	254	44
Jombang	151	45	327	57

Source: - Statistical Year Book of Indonesia 1988, Biro Pusat Statistik.
 - Produk Domestik Regional Bruto 1983-1986, Regional Planning Board (Bappeda) of East Jawa and Statistic Office (Kantor Statistik) of East Jawa.
 - Indonesia, Country Profile 1989-90, The Economist Intelligence Unit.

2.2.3 Spatial Development Patterns

(1) Land Use Pattern and Urbanization

1) Overall Land Use Characteristics

The present land use pattern in the objective area is presented in Figure 2.2.6. The major characteristics of the land use pattern are summarized as follows.

- Much of the objective area, except Bangkalan, is covered by wet-land paddy field.
- Most of the dry-land field is found in Kabupaten Bangkalan and the northern and southern parts of Kabupaten Lamongan. The major dry-land crops include maize, cassava and peanuts in Bangkalan and maize, peanuts and soybeans in Lamongan.
- Forest areas are mostly found in the southern parts of Kabupaten Lamongan and southern outskirts of mountains in Kabupaten Mojokerto.
- Fish ponds and salt-fields exist in 5 to 10 km width along the coastal areas in Kabupaten Gresik, Kotamadya Surabaya and Kabupaten Sidoarjo.
- Urban areas are mainly found in Kotamadya Surabaya and Kabupaten capitals in the surrounding areas.

2) Urbanization

Urban areas in Figure 2.2.6 are defined as urban desas (villages) specified by Biro Pusat Statistik (Central Statistical Office) for the census survey scheduled in 1990. BPS classified all desas in the country into urban desa and rural desa according to the following three criteria.

- percentage of population engaged in the primary sector activities (agriculture, fishing etc.)
- population density
- number of urban facilities

Scores ranging from 0 to 10 are given to each of the items above and a desa with the total score of more than 20 is regarded as urban desa.

Annex 2.3. presents the number of urban desas by kecamatan.

In Figure 2.2.6, all areas outside urban areas fall under the category of rural desas where rural characteristics are dominant.

The major characteristics of the urbanization pattern in the objective area are summarized as follows.

- Surabaya is the dominant urban agglomeration in this area, reflecting its function as the regional center of East Jawa and East Indonesia.
- The areas to the south and southwest of Surabaya, mostly in Kabupaten Sidoarjo and Kabupaten Mojokerto, are more urbanized than other areas. Historically high agriculture productivity in this fertile Brantas river basin area has attracted population and this was followed by an improvement of access and living conditions attracting more people and economic activities.
- There are almost no urban areas in the central part of the objective area, areas between Babat and Jombang and between Lamongan and Mojokerto.
- In the northern part of the area, moderate levels of urban agglomeration are found in and around kabupaten capitals such as Kecamatan Lamongan and Kecamatan Gresik.
- In Bangkalan, most urban desas are found along the coastal area of Madura Island.
- In Figure 2.2.6, major urban areas are found along the national and provincial roads. Though not shown on the figure, smaller settlements are also located along kabupaten roads. This aspect implies the importance of looking into impacts of road development on urban development for projecting a future growth trend.

3) Present Land Use in Surabaya

Figure 2.2.7 presents the present land use in Surabaya. The major characteristics are summarized as follows:

Commercial/Business Area

Major commercial and business areas are found in the northern area around Tugu Pahlawan (Hero Monument) in Kecamatan Simokerto, Bubutan and Genteng.

Government/Public Institutions

To the northwest from Tugu Pahlawan, a cluster of government offices including the East Jawa Government is located. In the eastern part, two higher-educational facilities are found : Institute of Technology Sepuluh Nopember (ITS) and Airlangga University.

Industries

Industrial areas, including warehouses, are found in the following areas:

- Surabaya Industrial Estate at Rungkut (SIER) in Kecamatan Rungkut is the largest cluster of factories in Surabaya. To the northeast from SIER, a large number of factories are also found.
- Old industrial areas are found along Kali Surabaya (Surabaya river) : medium to large scale factories in central Surabaya and small scale industries in south Surabaya.
- In northwestern Kecamatan Tandes, the number of industries and warehouses have been rapidly increasing in the last few years.

Residential Area

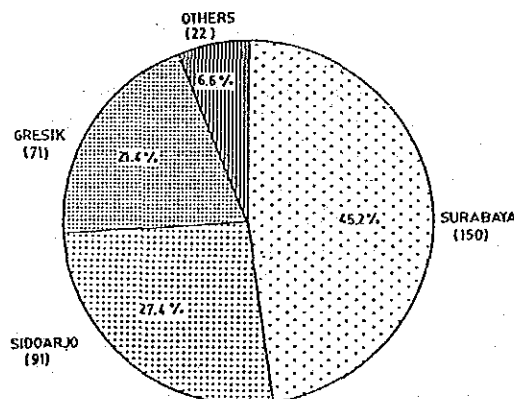
Residential areas have been growing on both sides of Kali Surabaya in a north-south direction. Recent trends include residential growth toward eastern kecamatans and toward the west along the roads leading to Cerme and Menganti.

(2) Investment Location

1) Distribution of Industrial Investment

GKS plays an important role in industrial investment in East Jawa, accounting for about two thirds (65.9%) of the industrial investments in East Jawa between 1968 and 1988 /1.

As shown below, most of the industrial investments (94%) in GKS are concentrated in Surabaya, Gresik and Sidoarjo. Surabaya itself contributes about a half (45%) of the industrial investments in GKS.



/1 PMDN and PMA only : investment which acquired approval for investment privileges such as import tax reduction or exemption from BKPM (Badan Koordinasi Penanaman Modal, or Investment Coordination Board.)

Surabaya, Sidoarjo and Gresik have attracted a large number of investments with their locational advantages such as good access and proximity to Surabaya, better infrastructure facilities and availability of laborforce.

2) Industrial Investment Location by Kecamatan

Figure 2.2.8 presents the distribution of industrial investments by kecamatan for PMA/PMDN /1 from 1968 to 1988.

The major characteristics of investment location in GKS are summarized as follows:

- Surabaya has been the major area for industrial investment. Large number of investments are found in kecamatan Tandes and Rungkut, many of which are industries located in SIER (Surabaya Industrial Estate at Rungkut).
- Industrial agglomerations are also found in the northern Sidoarjo kecamatans such as Waru, Taman and Gedangan and southern Gresik kecamatan Driyorejo.
- A moderate number of investments are found in kecamatan Gresik and surrounding kecamatans.
- A small number of investments are scattered in Kabupaten Mojokerto, many of which are likely agro-processing industries.
- The investments above are mainly located along the major arterial roads such as Surabaya-Sidoarjo, Surabaya-Krian, Waru-Krian and Surabaya-Gresik roads. This indicates access condition is an important factor influencing investment location.

The number of PMA/PMDN between 1968 and 1988 by kecamatan is presented in Annex 2.4.

3) Recent Trend

Figure 2.2.9 shows the recent trend of investment in the objective area /2. The major characteristics in the recent trend of investment location are summarized as follows.

- Comparatively speaking, major areas attracting investment are shifting from Surabaya to areas outside Surabaya.

/1 PMDN and PMA only : investment which acquired approval for investment privileges such as import tax reduction or exemption from BKPM (Badan Koordinasi Penanaman Modal, or Investment Coordination Board.)

/2 The number of investments classified as PMA/PMDN and non-PMA/PMDN, which obtained a location permit from BKPM and BPN. For non-PMA/PMDN projects, a location permit should be obtained from BPN (Badan Pertanahan Nasional, or the National Land Board).

- Areas outside Surabaya where there are existing accumulation of industries are attracting investment. These areas include Kecamatan Waru, Taman, Gedangan in Sidoarjo and Kecamatan Driyorejo in Gresik.

- Areas with no existing investment have seen no new investments.

The number of PMA/PMDN and non-PMA/PMDN between 1987 and 1989 is shown by kecamatan in Annex 2.5.

(3) Traffic Flow

Traffic flow on major roads is a good indicator of interconnection between different parts of the objective area. They clarify the extent to which major cities and towns in the objective area are interrelated in terms of passenger movement and economic activities. Figure 2.2.10 shows total daily traffic volume on national and provincial roads in the objective area. The base data was prepared by Bina Marga based on the traffic survey conducted in October 1989 as attached in Annex 2.6.

The figure clearly shows the correlation among the distribution of human settlements and economic activities and traffic flow generated. The largest traffic flow is found along the north to south axis: Surabaya - Waru - Sidoarjo and further south. This portion is provided with a good transportation system: a national road with 4-lane portion in the north and a 4-lane toll road down to Gempol. This north-south axis is characterized by continued alignment of urban desas, high population density and concentration of a large number of factories. A high level of development and good transportation system have resulted in the generation of a large traffic volume.

Traffic along this axis is likely composed of the following movements.

- passenger movement, mainly for commuting
- freight transportation between Surabaya and industrial areas in Sidoarjo for final goods and raw materials, some for export and import through Tanjung Perak
- freight transportation between the Surabaya area and the southern and eastern parts of the East Java Province
- traffic in the Surabaya - Waru portion going to and coming from Mojokerto - Jombang direction

Other major traffic flows with more than 10,000 vehicles a day are found in the following portions.

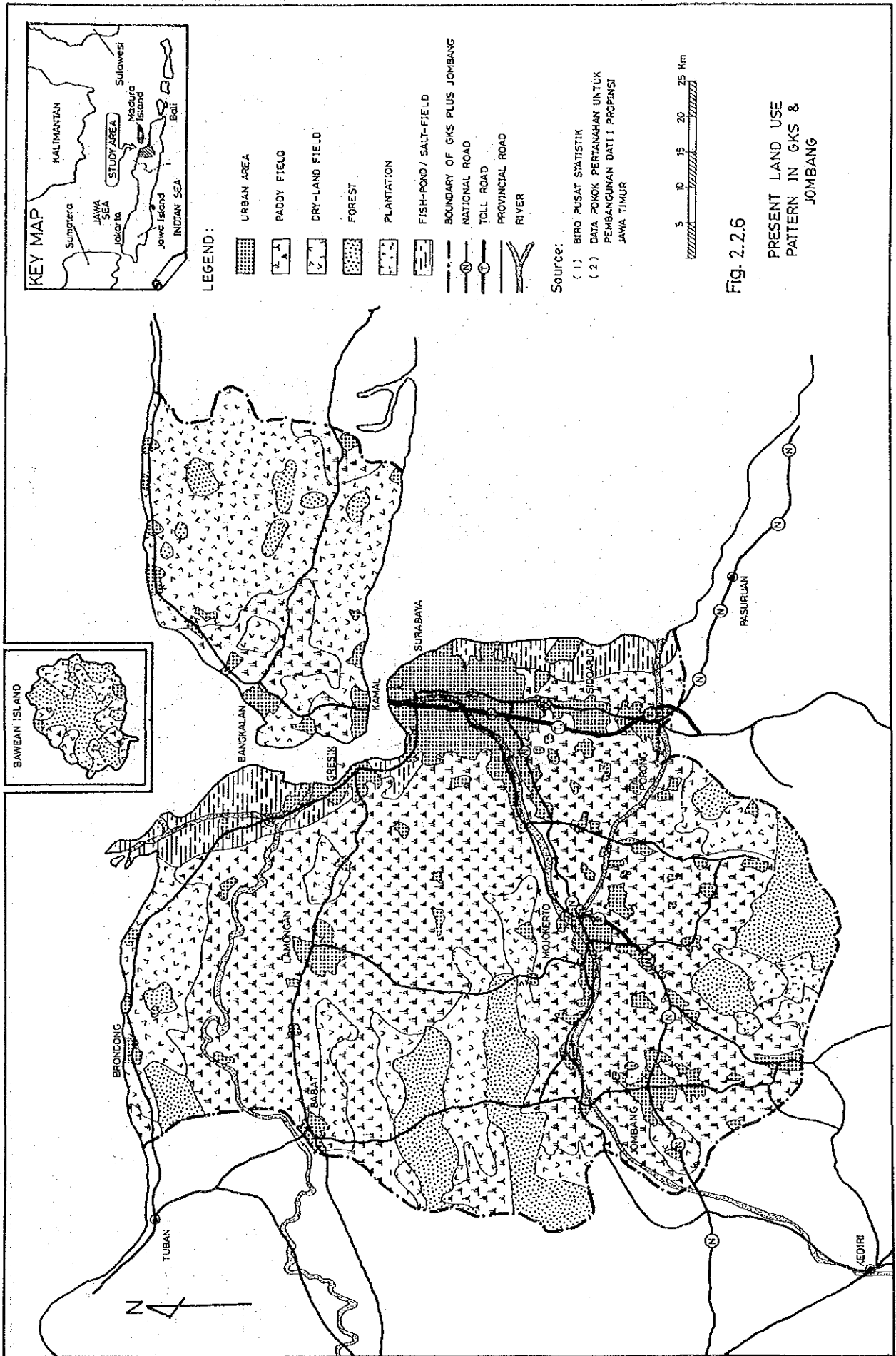
- Waru - Mojokerto - Jombang
- Surabaya - Driyorejo
- Surabaya - Gresik

Waru - Mojokerto - Jombang road functions as the major arterial road connecting the Surabaya area and the central part of East Java Province. A relatively high concentration of human settlement is also found along this road. Traffic in this portion mainly includes freight transportation between the Surabaya area and the central part of the province and passenger movement for commuting and economic activities.

The area from southwestern Surabaya to Driyorejo shows a ribbon development pattern along the provincial road. Urban desas are continuously aligned and a large number of factories in Kabupaten Gresik are found in this area, Kecamatan Driyorejo. Most traffic in this Surabaya - Driyorejo portion would be through-traffic going to and coming from the Mojokerto/Jombang direction. Traffic through Driyorejo joins that from Waru at Taman and heads for Krian or in other direction traffic from Krian diverts into Driyorejo and Waru directions and reaches Surabaya.

Gresik is comparable with Sidoarjo in terms of the size of economy and population and physical distance from Surabaya. Gresik is, however, linked with Surabaya to a much less degree. Traffic volume between Gresik and Surabaya (16 thousand per day) is almost one-third of that between Waru - Sidoarjo (33 thousand per day). This indicates Gresik's relatively high degree of independence in economic activities and human settlement pattern. This characteristic of Gresik might have been strengthened by the existence of four ports, including 1 public port and 3 private industrial ports and a limited access condition from Surabaya.

Traffic between Surabaya and Gresik would include through-traffic going to and coming from Jakarta, West Java and Central Java through Gresik and Lamongan in addition to freight and passenger movement between Gresik and Surabaya.



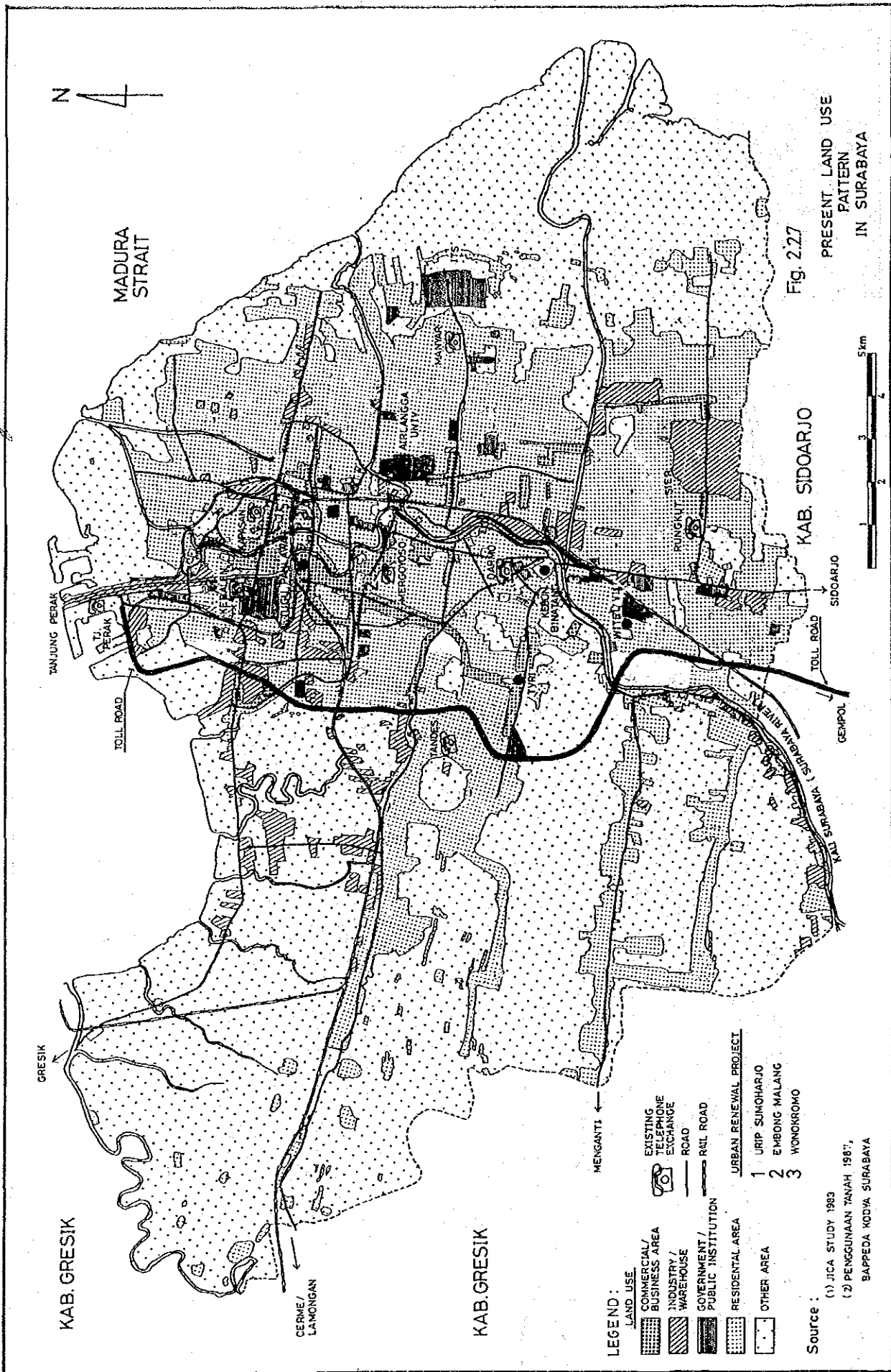
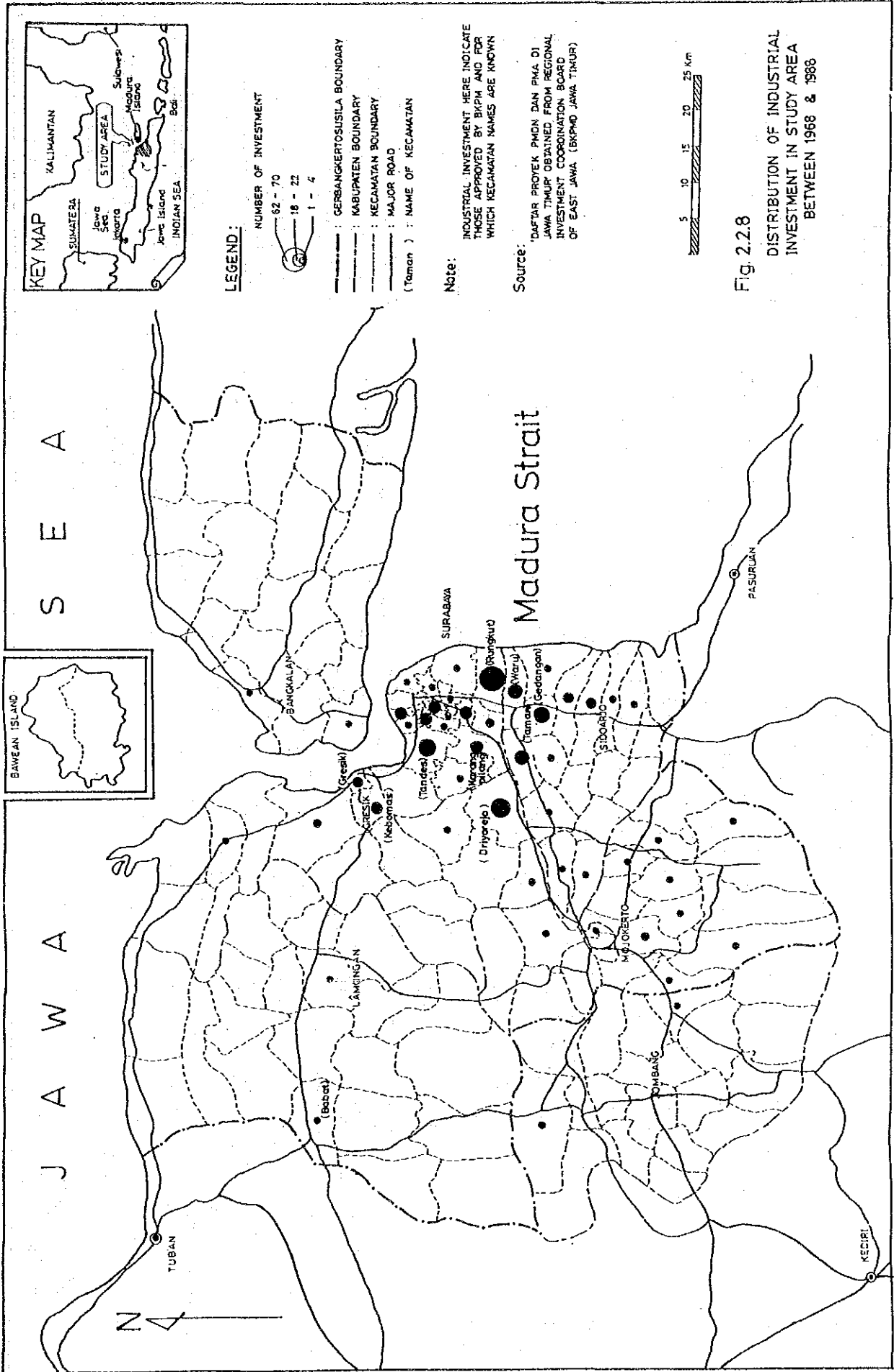
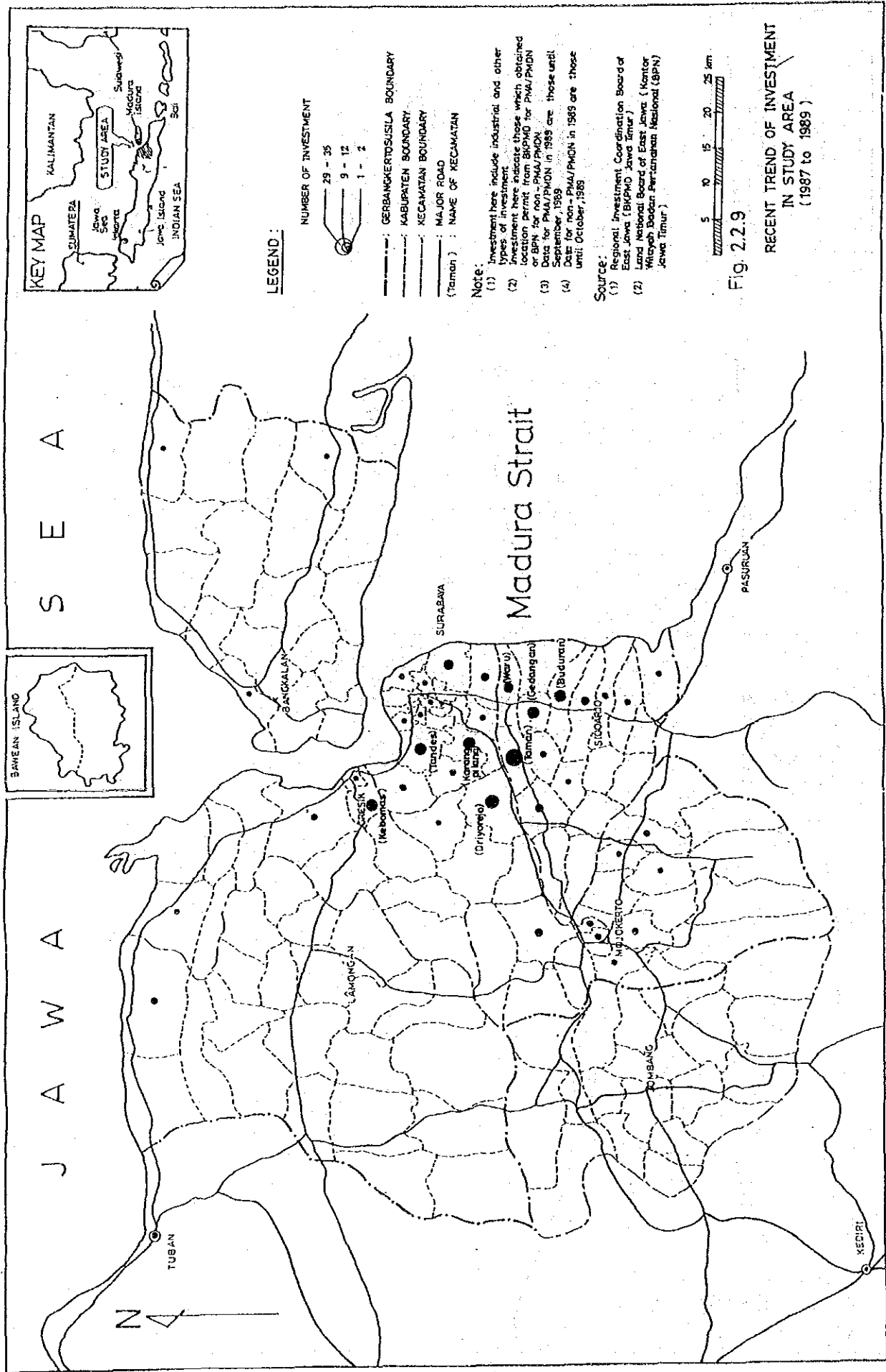
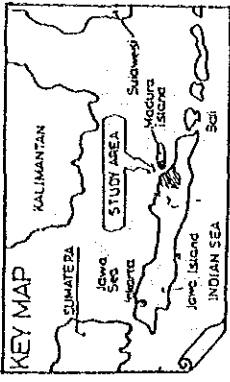


Fig. 2.27
PRESENT LAND USE PATTERN IN SURABAYA





J A W A
S E A



LEGEND :

- NUMBER OF INVESTMENT
- (largest) : 29 - 35
 - (medium) : 9 - 12
 - (smallest) : 1 - 2
- : GERBANGKERTOSUSILA BOUNDARY
 - - - : KABUPATEN BOUNDARY
 - : KECAMATAN BOUNDARY
 - : MAJOR ROAD
 - (Taman) : NAME OF KECAMATAN

Note:

- (1) Investment here include industrial and other types of investment
- (2) Investment here indicate those which obtained location permit from BKPM/PHM for PMA/PMON or BPN for non-PMA/PMON
- (3) Data for PMA/PMON in 1989 are those until September, 1989
- (4) Data for non-PMA/PMON in 1989 are those until October, 1989

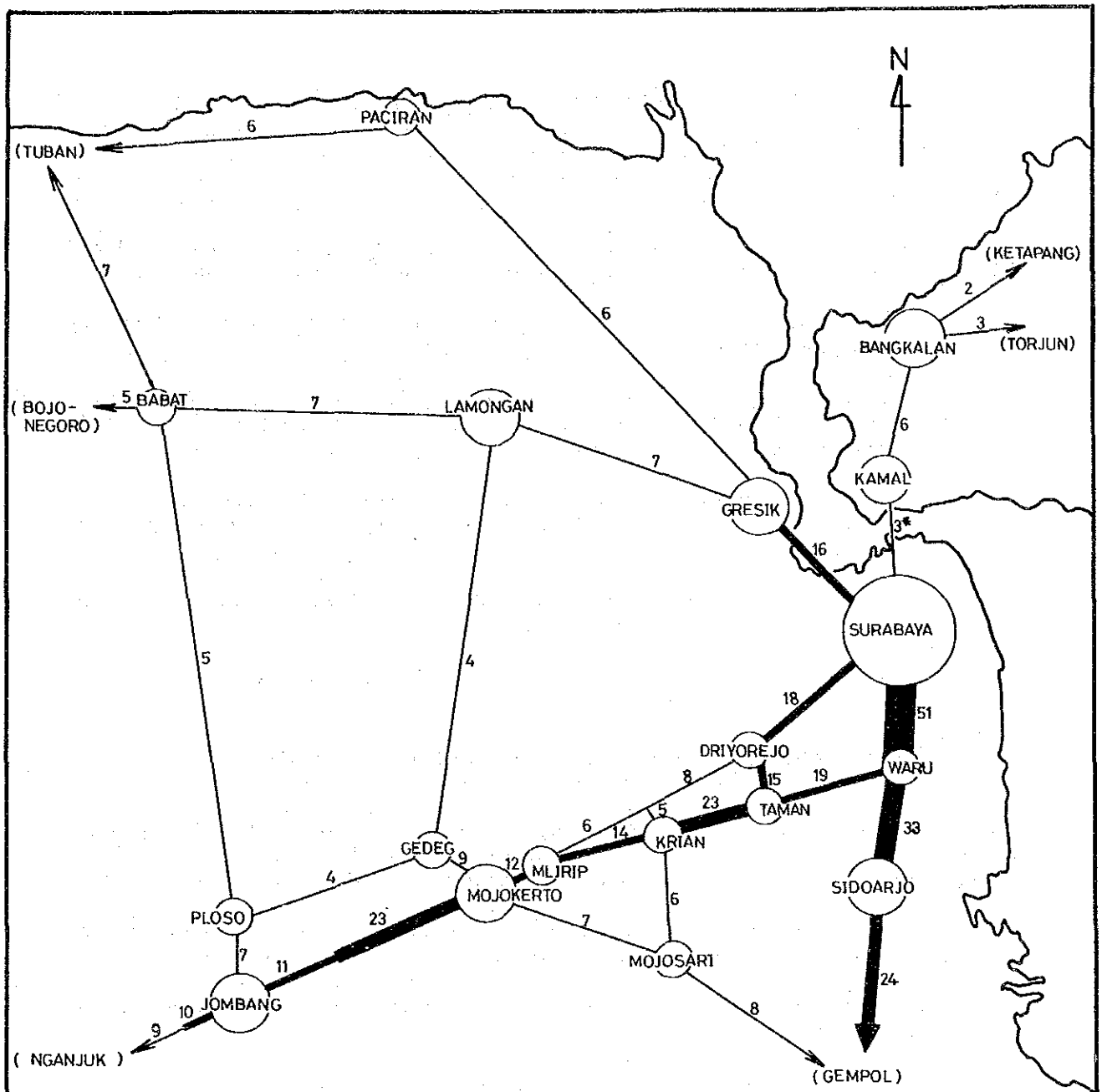
Source:

- (1) Regional Investment Coordination Board of East Java (BKPM/PHM Jawa Timur)
- (2) Land National Board of East Java (Kantor Wilayah Badan Pertanahan Nasional (BPN) Jawa Timur)



Fig. 2.29

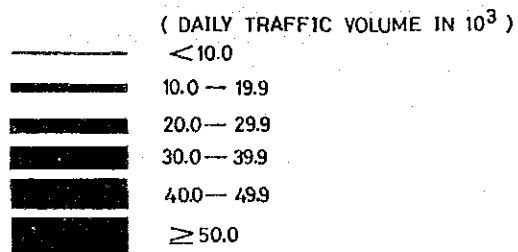
**RECENT TREND OF INVESTMENT
IN STUDY AREA
(1987 to 1989)**



LEGEND :

SURABAYA : MAJOR CITIES/TOWNS IN STUDY AREA

(GEMPOL) : MAJOR CITIES/TOWNS OUTSIDE THE STUDY AREA



(SCALE = 1:500,000)

Notes:

(1) FIGURES INDICATE THE TOTAL DAILY NUMBERS OF ALL TYPES OF MOTORIZED VEHICLES IN THOUSANDS

(2) *NUMBER OF VEHICLES CARRIED BY FERRY IN 1986

Source :

DATA FROM TRAFFIC SURVEY CONDUCTED IN OCTOBER 1989 BY BINA MARGA

FIG. 2.2.10	DAILY TRAFFIC VOLUME ON NATIONAL AND PROVINCIAL ROADS
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2.3 Regional Development Framework

2.3.1 Existing Development Plans

(1) General

The following existing plans for GKS and East Java were analyzed and whichever component deemed relevant was integrated into the present study.

- "Urban Development Planning Study on GERBANGKERTOSUSILA Region" by JICA, 1983 (hereafter JICA Study 1983)
- "Rencana Umum Tata Ruang Wilayah, GERBANGKERTOSUSILA (GERBANGKERTOSUSILA General Spatial Plan)" by Bappeda and ITS, 1987 (hereafter GKS General Plan)
- "Rencana Pembangunan Lima Tahun V (Repelita V), Jawa Timur (The Fifth Five Year Plan, East Java)" by East Java Government, 1989 (hereafter Repelita V).
- "Tata Ruang Jawa Timur, 2008 (East Java Spatial Plan, 2008)" by East Java Government (hereafter East Java Plan 2008)

The major issues dealt with in the above plans are briefed in the following.

(2) "Urban Development Planning Study on GERBANGKERTOSUSILA," (JICA Study 1983)

The objective of JICA Study 1983 was to formulate the regional development strategy and structure plan of GKS for the year 2000. The JICA Study 1983 conducted a comprehensive study covering wide range of socio-economic and regional development planning aspects. Based on the analysis, JICA Study 1983 proposed the urban structure plan of Surabaya Metropolitan Area and a list of projects to be implemented.

In the present study, the following issues are found relevant and referred to or integrated into the analysis of the study.

- analysis on growth potentials in GKS
- analysis on the traffic condition

(3) GERBANGKERTOSUSILA General Spatial Plan (GKS General Plan)

GERBANGKERTOSUSILA (GKS) General Spatial Plan was completed in 1987 by Regional Planning Board (Bappeda) of East Java and Institute of Technology Sepuluh Nopember (ITS). GKS General Plan incorporated some of the major strategies presented in the JICA Study 1983.

The basic planning approach made by the GKS General Plan is to integrate an urban development approach in Surabaya, Gresik and Sidoarjo and a rural development approach in Bangkalan, Mojokerto and Lamongan. As for the intermediary areas to fill the gaps between urban and rural areas, the GKS General Plan considers several developing areas: semi-urban and transition areas. For each of these three categories, the GKS General Plan puts priority on development in terms of socio-economy, utility and environment.

Integrating the findings by the National Urban Development Strategy (NUDS) Project, the GKS General Plan proposes further study on the following 13 cities as the potential areas: Porong, Sidoarjo, Krian, Taman, Mojokerto, Sooko, Mojokerto, Babat, Lamongan, Paciran, Gresik, Surabaya and Bangkalan.

The land use plan prepared by the GKS General Plan assumes the following areas as the areas to go through industrial growth.

- axis between Rungkut and Taman
- northwest axis between Tanjung Perak and Gresik
- Kenjeran in Surabaya
- Kamal in Bangkalan
- Mojokerto - Gedeg area

(4) The Fifth Five Year Development Plan (Repelita V) of East Jawa

Repelita V for East Jawa was prepared by the East Jawa Government as part of a national development plan. The development plans for each kabupaten and kotamadya were prepared by each regional government. The major points considered relevant to the present study are summarized as follows:

- In the next five years, the government aims at an industrial growth of 9.6% per annum in the East Jawa Province. To achieve this level of industrial growth, East Jawa needs at least Rp.3.3 billion of industrial investment. GKS should play a vital role as the dominant and leading investment location in East Jawa during Repelita V.
- In Repelita V, the East Jawa Government aims at economic growth of 5.00% per year. For GKS region the economic growth of 6.30% per annum is aimed at. For the population growth, the government projects that the population in GKS region will grow by 1.40% annually during Repelita V, while East Jawa will grow by 1.12% per year. This indicates the government's perception of the role of GKS as the most economically important area providing job opportunities for the population in East Jawa.
- Repelita V also projects and presents the economic growth, the population growth and their priority fields of development for each kabupaten and kotamadya as summarized below:

Area	Economic Growth	Population Growth	Development Priority
	Target 1989 - 1994 (% / year)	Target 1989 - 1994 (% / year)	
GKS	6.30	1.40	industry, trade
Surabaya	3.16	2.49	trade, hotel, restaurant
Mojokerto (d)	6.45	1.13	small industry
Gresik	4.45	1.50	industry, agriculture
Sidoarjo	6.90	2.28	industry, fishery, livestock
Mojokerto	3.14	1.40	agriculture, industry
Lamongan	4.50	1.14	agriculture, industry
Jombang	5.00	1.18	agriculture, estate crops
Bangkalan	5.00	0.49	industry

In the present study, the growth targets above were analyzed and applied, with modifications where necessary, to projecting future GRDP and the population in GKS.

(5) Tata Ruang Jawa Timur 2008 (East Jawa Plan 2008)

East Jawa Plan 2008 presents the most updated long-term development policies of East Jawa.

As detailed in the following subsection 2.3.2, the major development policies of the East Jawa Province presented in this plan are summarized as follows:

- promotion of industrial growth in the northern parts of the province (e.g. Gresik, Lamongan, Tuban)
- promotion of industrial growth in Bangkalan through constructing the Surabaya - Madura Bridge
- promotion of agriculture production in the central fertile areas of the province (e.g. Sidoarjo, Mojokerto)

Based on this policies, East Jawa Plan 2008 prepared the land use plan for 2008 as presented in Figure 2.3.1.

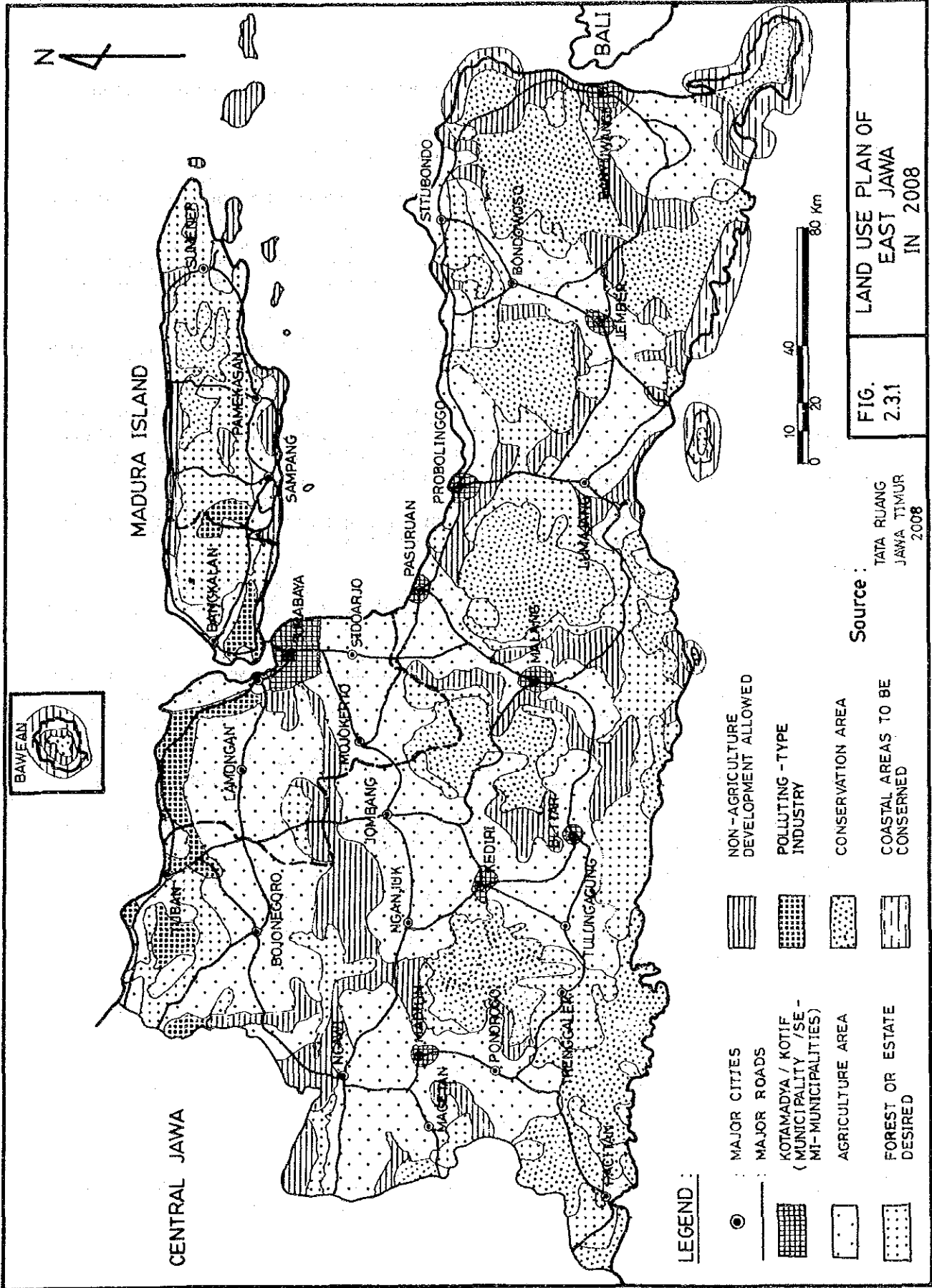


FIG. 2.3.1
LAND USE PLAN OF
EAST JAWA
IN 2008

Source :
TATA RUANG
JAWA TIMUR
2008

2.3.2 Development Policies, Potentials and Prospects of Transportation Projects

(1) Development Policies of East Jawa Government

The East Jawa Government faces the following two challenges in the coming decades.

- to increase agriculture production to secure food supply to the increasing East Jawa population and meet the target of supplying 40% of the national food stock
- to lead economic growth of East Jawa and eastern Indonesia through industrialization

The policy of East Jawa Government is to achieve both of these targets through developing a land use pattern emphasizing efficient use of land resources: increase of agricultural production in fertile areas and promotion of industrial growth in less fertile areas.

The basic strategies for the development of GERBANGKERTOSUSILA are formulated along these policies as summarized below.

- to promote industrial growth in the northern parts of GERBANGKERTOSUSILA, especially Gresik and Lamongan, where agriculture productivity is low
- to promote industrial growth in Bangkalan where agriculture productivity and economic level are low, through constructing the Surabaya - Madura Bridge
- to promote increase of agriculture production through further intensification in fertile areas such as Sidoarjo and Mojokerto

The land use plan for East Jawa Province was prepared by East Jawa government reflecting the above policies and strategies as shown in Figure 2.3.1.

(2) Development Potentials in the Study Area

Data were collected regarding the development potentials of the objective area and briefly analyzed. Data collected generally supports the development policies of East Java government: promotion of industrial growth in the northern part and further intensification of agriculture production in the central part of the province. The following summarizes some of the findings regarding growth potentials in the objective area.

Land Availability

Figure 2.2.6 on the present land use pattern shows a higher level of development in the southern part and sparse development of built-up areas in the central and northern parts including Bangkalan in the study area. This indicates the possibility that land suitable for industrial growth is available in a larger amount in the northern parts of the study area: Gresik, Lamongan and Bangkalan.

Some data show there is large amount of non-irrigated and rain-fed paddy fields in Lamongan, Gresik and Bangkalan amounting to more than 150,000 ha in total. In Mojokerto /1 and Jombang, on the contrary, rain-fed paddy fields cover only 27,000 ha. Most of the paddy fields in Jombang and Mojokerto are irrigated in some form. Rain-fed paddy fields are more suitable to be converted to non-agriculture use than areas already irrigated from the viewpoint of efficient use of the development fund.

Table 2.3.1 presents the area of irrigated and rain-fed paddy fields in GKS.

Land Productivity

Fertility of land and level of previous investments in irrigation facilities result in different levels of land productivity. Figure 2.3.2 (originally prepared by JICA Study 1983) shows the productivity distribution by kecamatan in the objective area.

In terms of paddy produced in one hectare, most areas in Sidoarjo and Mojokerto are classified as either "very high" or "high" productivity area. In the northern part, the areas north of Gresik - Lamongan - Babat road and in Bangkalan are classified as "low" or "very low" productivity area. Obviously, areas with a low agriculture productivity are more suited to be converted to non-agriculture use than productive areas.

/1 Area of non-irrigated paddy field in Sidoarjo was not known.

Mineral Resources

In general, northern areas, especially Gresik, are endowed with rich mineral resources such as limestone, loam, dolomite and phosphate.

(3) Future Prospect of Major Transportation Projects

The analysis of the present conditions in the objective area in subsection 2.2 confirmed the important role played by road development, which affected the regional development pattern. It was found most of the industrial investments and urban desas were located along national and provincial roads. Although it is a combination of factors that influence the spatial development pattern of a region, it is certain that the improved access through road improvement and development should play a vital role. In this regard, the study looked into the progress and future prospect of road development in the objective area as a representative indicator for projecting future growth directions.

1) Surabaya - Gresik Portion

The government's effort to improve access between Surabaya and Gresik is composed of two components: improvement of the existing road connecting Surabaya and Gresik and the new toll road project connecting Surabaya and Gresik.

Existing Surabaya - Gresik Road

The existing Surabaya - Gresik road carrying about 16,000 vehicles per day has been suffering from a traffic congestion problem. To solve the problem, improvement of the road is currently going on through reconstruction of bridges and the expansion of road width aiming at expanding the carrying capacity of the road.

Surabaya - Gresik Toll Road

The Surabaya - Gresik toll road project is a major project given first priority in the transportation sector by the East Java government. The objective of the project was originally to ease the traffic congestion along the existing Surabaya - Gresik road. As the provincial policy of promoting growth in the northern areas has been crystalized recently, the role of the project as a tool to guide development to northern areas has been added to the objective.

The study on the project was carried out by the Road Betterment Office, Bina Marga, in 1982. In 1988 and 1989, the possibility of implementing the project with private sector's participation was sought. Two private groups, one French and the other British, studied the project, but unfortunately both of these groups reached the conclusion that the project is not financially feasible due to high land compensation cost for existing industries. At present, the government is considering two possibilities for the implementation of the project:

- The government takes responsibility for land compensation and the private sector invests in the project excluding land compensation.

- The government might propose the inclusion of the project as a component of a package comprising Surabaya - Gresik, Gempol - Malang and Gempol - Pasuruan portions.

Future Prospect

In the study, it was assumed that access to Gresik would be improved by the end of Repelita V and the positive impact on the regional development pattern begins to be seen during Repelita VI.

2) Surabaya - Madura Bridge

Background/Objective

The Surabaya - Madura Bridge project is a challenging project being promoted by BPPT /1. The project is proposed and planned along the provincial policy of guiding industrial and urban development toward northern areas of the province. The project is anticipated to trigger the economic growth of Madura, especially Bangkalan, contributing to enhancing the GKS's role as the industrial and commercial center of East Java and eastern part of Indonesia as well as upgrading the income level of the Madura population. While existing built-up areas in Surabaya and Sidoarjo are likely to face constraints meeting industrial and residential demands in the near future, Madura, especially, Bangkalan, has high growth potentials such as follows once the bridge is completed.

- proximity to Surabaya
- availability of huge area suitable for growth
- low land price

Progress and Future Prospect

A preliminary study of the project was completed in September 1989 by the Japan - Indonesia Science and Technology Forum. A more detailed feasibility study by a Japanese and Indonesian private consortium is scheduled to be carried out from 1990 for about one-year.

In the study, it was assumed that the Surabaya - Madura Bridge be completed by the end of Repelita VI (1999). As the basis for this assumption, the following number of years were assumed as the minimum number of years until the completion of the project.

- two to three years for detailed design, financial arrangement and negotiation etc.
- five years for construction

/1 Badan Pengkajian dan Penerapan Teknologi (Agency for the Assessment and Application of Technology)

3) Waru - Mojokerto Highway

Waru - Mojokerto is one of the most congested roads in the objective area, carrying about 20,000 vehicles per day. In response to the request made by the Indonesian Government, the Japan International Cooperation Agency is scheduled to conduct a feasibility study of the project in 1990. Steps toward the implementation shall be arranged based on the completion of the study. In the event that the study proposes the implementation of the project, it is likely that the project will be completed sometime during Repelita VI (1994 - 1999).

In the study, it was assumed that the impact of the Waru - Mojokerto highway on investment location would be limited for the following considerations.

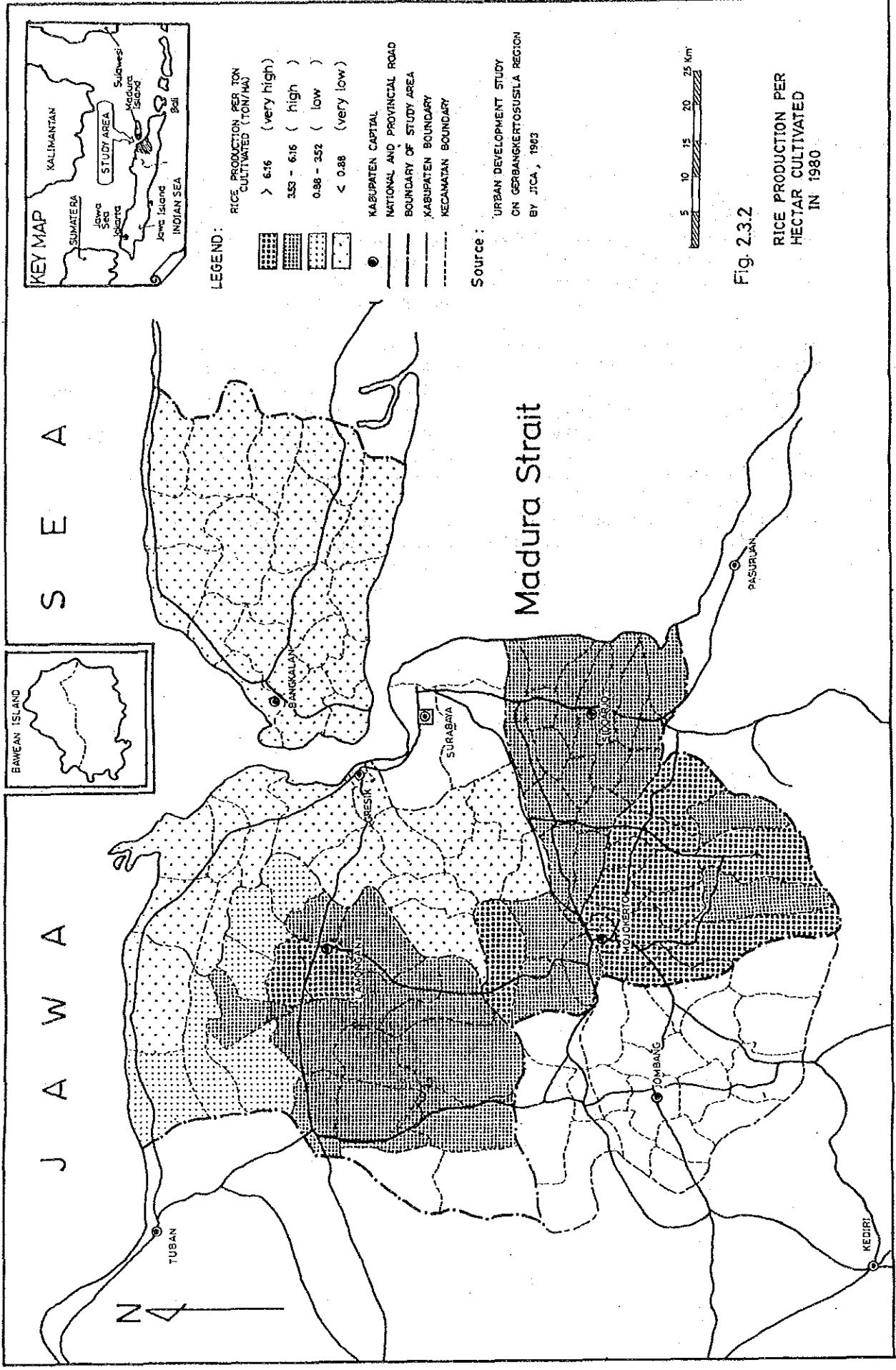
- Locational advantages of the northern areas will have been improved substantially by Repelita VI and VII.
- It will not be easy for investors to find infertile land suitable for industrial development in Mojokerto.
- According to its policy, the East Jawa government would guide industrial projects to northern areas.

Table 2.3.1 Irrigated and Non-irrigated Areas

(Unit : ha)

Area	Non-agricul- -ture area	Agriculture Area			Total area
		Irrigated	Non-irri- -gated	Total	
Kab Mojokerto	47,893	31,954	17,968	49,922	97,815
Lamongan	30,383	57,504	79,004	136,508	166,891
Bangkalan	86,998	6,725	34,065	40,790	127,788
Gresik	73,249	3,858	40,570	44,428	117,677
Jombang	52,963	38,886	9,278	48,164	101,127

Note : Figures in the Repelita V report and from other sources were integrated to derive the figures in the table.



J A W A

S E A

Madura Strait

2.3.3 Development Directions until 2004

(1) Objective and Assumptions

The future growth scenario of GERBANGKERTOSUSILA is formulated, focusing on the major directions of industrial growth until the year 2004. The growth scenario serves as the basis of the regional development framework, thus providing framework for telecommunications demand projection and planning.

The basic assumption is that industrial growth is the major factor influencing basic spatial and economic characteristics of GERBANGKERTOSUSILA in the coming decades. The industrial sector is also anticipated to lead the economic growth of the region contributing to an increased income level of the population and the creation of job opportunities.

In formulating the growth scenario, the following aspects were considered.

- recent trend in investment location
- government policies in regional development
- prospect of infrastructure development
- major factors influencing investment location decision

The recent trend in investment location was analyzed as presented in sub-section 2.2.3.

With regard to the government policies, as presented in sub-section 2.3.2, it was assumed that related government offices such as follows would make concerted efforts to implement the government policies.

- Bappeda (Badan Perencanaan Pembangunan Daerah) /1
- BKPM (Badan Koordinasi Penanaman Modal Daerah) /2
- BPN (Badan Pertanahan Nasional) /3
- respective offices in charge of infrastructure facilities

Prospects of infrastructures development were taken into consideration, focusing on the major transportation projects as presented in the preceding sub-section 2.3.2.

Industrialization would be for the most part promoted by private investments. In this sense, factors influencing investment location should be considered for making realistic projection of the future growth directions. Generally the following are regarded by private investors as the important factors in deciding investment location.

1 Regional Planning Board

2 Regional Investment Coordination Board

3 National Land Board

- proximity to existing factories
- proximity to financial institutions
- land price
- relationship with market
- availability of skilled laborforce
- availability and price of raw materials
- level of infrastructure and utility facilities

(2) Industrial Growth Direction until 2004

Based on the consideration of the items presented above, the major directions of industrial growth in GERBANGKERTOSUSILA were projected for Repelita V (1989-1994), Repelita VI (1994-1999) and Repelita VII (1999-2004). Figure 2.3.3 presents the summary of the growth scenario.

The following are the basic concepts underlying the projected growth scenario for each Repelita.

Repelita V (1989 - 1994)

- 1) Major industrial growth is directed toward the south, as the comparative advantages of the southern area in Sidoarjo, especially in such kecamatans as Taman, Gedangan, Buduran and Waru, remain unchanged during the rest of the Repelita V period.
- 2) Some growth keeps taking place also toward southwest in Driyorejo, Gresik, toward Tandes in Surabaya and in some kecamatans surrounding Kecamatan Gresik.
- 3) In Kotamadya Surabaya, industrial growth remains directed in the northwest direction toward Kecamatan Tandes and further to Kecamatan Benowo in later years.

Repelita VI (1994 - 1999)

- 1) Major industrial growth is directed toward areas surrounding Kecamatan Gresik in Kabupaten Gresik as:
 - access conditions are improved through the improvement of existing roads and possibly completion of the Surabaya - Gresik toll road,
 - improvement of telecommunications facilities, especially enhancement of switching capacity at the Gresik exchange proceeds, and
 - water supply capacity in Gresik is expanded.
- 2) Industrial growth toward the south (Sidoarjo) and southwest (Driyorejo in Kabupaten Gresik) continues, but at a lower rate as it becomes increasingly difficult to find infertile lands suitable for industrial development and land prices rise.

Repelita VII (1999 - 2004)

- 1) Bangkalan gains momentum in industrial growth as the Surabaya -Madura bridge is completed and other infrastructure and utility facilities are improved and expanded.
- 2) Industrial growth around Kecamatan Gresik continues and some industries start to pop up in Kabupaten Lamongan especially in areas close to the boundary with Kabupaten Gresik.

(3) Role of Surabaya

While industrial activities expand in surrounding areas, Surabaya would keep reinforcing its role as the regional gateway and the center for commercial and business activities in East Jawa and eastern Indonesia. Tertiary sector activities regarding commerce, financial transactions etc. would grow in parallel with and supporting industrial growth in surrounding areas. GERBANGKERTOSUSILA region as a whole would, thus, enhance its function as the regional center for industrial production and tertiary sector activities.

Recent developments in the private sector are along this trend. The following three ongoing urban renewal projects in Surabaya could be regarded as part of Surabaya's development to a higher level and more sophisticated city as the regional center.

Location	Land Area for development (ha)	Years assumed for completion since 1990
Urip Sumoharjo	26	10
Embong Malang	20	10
Wonokromo	12	7

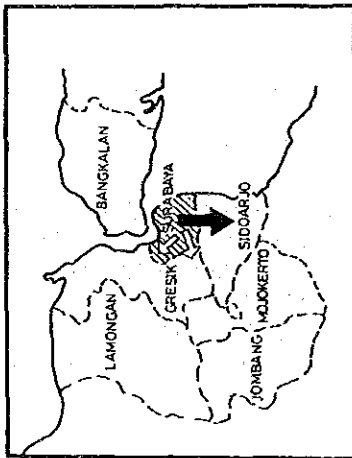
The location of these projects are shown in Figure 2.2.7.

The task to be borne by the public sector would be to guide and promote the private promoted activities such as above in a region-wise and balanced manner and support these developments through providing and expanding infrastructure and utility facilities. Communication means, especially telecommunications and transportation facilities, would play an essential role for Surabaya to grow into a sophisticated regional center.

FIGURE 2.33

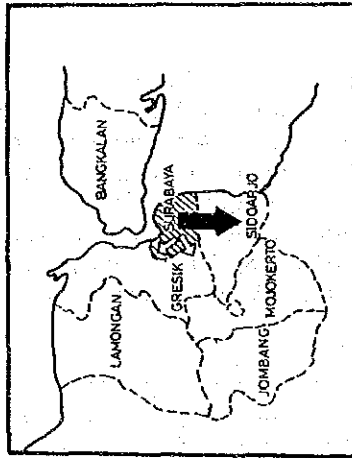
MAJOR INDUSTRIAL GROWTH DIRECTIONS UNTIL 2004

(PRESENT)

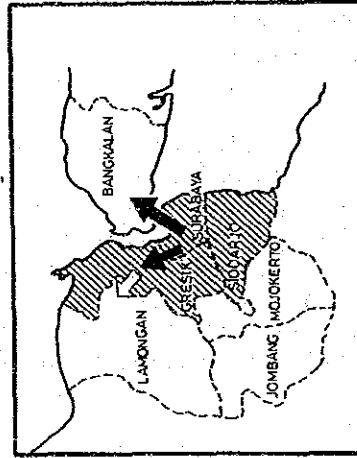


- Major growth is directed toward south.
- Some growth are taking place in Gresik and Surabaya.

(REPELITA V, 1989-1994)

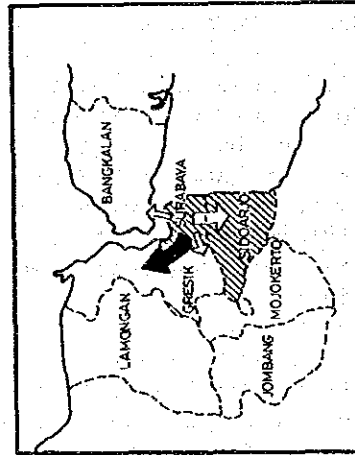


- Present pattern remains basically the same.



- Bangkalan gains momentum as Surabaya-Madura Bridge is completed and infrastructures are improved.
- Gresik keeps growing at a high rate.
- Some development starts to take place in Lamongan.

(REPELITA VII, 1999-2004)



- Major industrial growth is directed toward northwest as access to improved and infrastructures are expanded.
- Industrial growth to south continues at a lower rate as it becomes increasingly difficult to find industrial land.
- Some growth to Bangkalan starts to take place.

(REPELITA VI, 1994-1999)

LEGEND :



DIRECTION OF MAJOR INDUSTRIAL GROWTH



DIRECTION OF MODERATE INDUSTRIAL GROWTH



BUILT-UP INDUSTRIAL AREA

2.3.4 Regional Development Framework

(1) Objective

The regional development framework was formulated in terms of population, GRDP and GRDP per capita until 2004. These indices would serve as the basis for the telecommunication demand projection.

(2) Population

In the analysis of present conditions in the preceding sub-section 2.2, two kinds of data regarding population were used:

- population data from censuses and Supas and
- registered population.

In projecting the future population, the former data, population from censuses and Supas, were used. While the registered population was useful for grasping recent growth trends by kecamatan, the data from censuses and Supas more closely represent the actual number of people and, therefore, are more suitable to be used as the basis for projection.

Projection of the future population was conducted based on trend analysis of the population since 1961. As already presented in sub-section 2.2.2, the population growth rates of each kabupaten and kotamadya in the 1960's, 1970's and 1980's were as follows.

Population Growth Rates (%/year)

Area	(1)1961 - 71	(2)1971 - 80	(3)1980 - 85	(2)-(1)	(3)-(2)
Gresik	0.31	1.98	1.88	+1.67	-0.10
Bangkalan	0.95	0.96	0.83	+0.01	-0.13
Mojokerto (Kab plus Kodya)	1.85	1.86	1.86	+0.01	0
Surabaya	3.00	2.91	2.91	-0.01	0
Sidoarjo	3.85	2.78	2.69	-1.07	-0.09
Lamongan	1.64	1.61	1.50	-0.03	-0.09
GKS	2.07	2.18	2.16	+0.11	-0.02
Jombang	n.a.	1.66	1.54	n.a	-0.12

While no consistent pattern is observed in the change of growth rates from 1960's to 1970's, there are some common patterns in the trend from 1970's to 1980's such as follows:

- decrease in growth rates by around 0.1%
(Gresik, Bangkalan, Sidoarjo, Lamongan and Jombang)
- constant growth rates (Mojokerto and Surabaya)

Generally speaking, it is considered that the reduction of birth rates due to an active family planning program in the 1970's, resulted in the fall of population growth rates. In Surabaya, however, the population growth rate remained constant, since the effect of falling birth rates was cancelled out by the influx of population moving into Surabaya.

The trends above were assumed to continue in the coming decades and applied to the projection of the population until 2004. The following are the assumed annual population growth rates for every ten-year period.

Assumed Population Growth Rates (%/year)

Area	1980 - 90	1990 - 2000	2000 - 2010
Gresik	1.9	1.8	1.7
Bangkalan	0.8	0.7	0.6
Kab.Mojokerto	1.9	1.9	1.9
Kodya Mojokerto	1.9	1.9	1.9
Surabaya	2.9	2.9	2.9
Sidoarjo	2.7	2.6	2.5
Lamongan	1.5	1.4	1.3
Jombang	1.5	1.4	1.3

Based on the 1985 population from Supas and the annual growth rates assumed as above, populations in the objective area are projected for 1989, 1994, 1999 and 2004, the last years of Repelita IV, V, VI and VII respectively.

The results of the projection are presented in Table 2.3.2 and summarized as follows.

Year	Population in GKS and Jombang (thousands)
1989	8,507
1994	9,425
1999	10,450
2004	11,577

(3) Gross Regional Domestic Product

Gross Regional Domestic Product (GRDP) for respective kabupaten and kotamadya were estimated for 1989, 1994, 1999 and 2004. The base data used were GRDPs for the respective areas in 1986 in 1980 price as presented in sub-section 2.2.2.

The GRDP in respective years were estimated and projected based on the following annual growth rates.

Assumed Annual Growth Rates of GRDP (%/year)

Area	1986 - 89	1989 - 94	1994 - 99	1999 - 2004
Gresik	4.5	4.5	8.0	8.0
Bangkalan	5.1	5.1	5.1	6.9
Kab. Mojokerto	3.1	5.0	5.0	5.0
Kodya Mojokerto	6.5	6.5	6.5	6.5
Surabaya	6.7	7.2	7.2	7.2
Sidoarjo	6.2	9.7	8.3	6.9
Lamongan	4.5	5.0	5.0	5.0
Jombang	2.1	5.0	5.0	5.0

The following explain the methods applied to setting the annual growth rates of GRDP.

Growth Rates for 1986 - 1989

The annual growth rates between 1986 and 1989 are taken from the Repelita V report for the respective areas. Repelita V report presents GRDP estimates for 1986 and 1989 as part of the descriptions on present conditions of the respective areas. Average annual growth rates derived from these estimates are applied to estimating GRDP in 1989 in 1980 price.

Growth Rates for 1989 - 1994

Repelita V report presents the GRDP growth targets and the projection of GRDP for each area until 1993. Whenever they are consistent and judged reasonable, the rates in Repelita V were used. The problem encountered regarding these targets and projections, however, is inconsistency between the assumptions in some cases. In Sidoarjo, for example, the annual growth target of GRDP is presented as 6.9% per year in the main text, while that used for estimating GRDP in 1993 in the same report is 9.7% per year. In these cases, two different growth targets were compared and whichever was judged more appropriate was applied to the present study. In some other cases, the assumed target growth rates are considered too low requiring some kind of adjustment.

The following explain considerations given to Surabaya, Sidoarjo, Kabupaten Mojokerto and Jombang in this regard.

Surabaya:

Repelita V report presents the minimum growth target of 3.16% in the text, as well as GRDP projection using 7.2% growth per year. Considering the past trend and the leading role to be borne by Surabaya, the latter rate of 7.2% per year is used in the study.

Sidoarjo:

Repelita V report presents 6.9% per year as the target and 9.7% per year as the basis for projecting GRDP. The study adopts the higher rate of 9.7% per year considering recent rapid increase of investment in Sidoarjo ^{/1} and its leading role in GKS's economic growth during Repelita V.

Kabupaten Mojokerto:

Both policy targets and the growth rate used for projection are 3.1% per year. Considering this rate is too low compared with the past trend (3.6% per year between 1980 and 1986) and too pessimistic as the growth target, the study adopted 5.0% growth per year for Repelita V. It is assumed that the Mojokerto's economy will keep growing in pace with East Jawa at 5.0% per year. This rate of growth would be achieved mainly through intensification of agriculture production.

Jombang:

Repelita V report presents 5.0% per year as the growth target and uses 2.1% per year for projection. The study adopts 5% per year, as this rate is highly possible to be attained considering past performance (4.8% per year between 1980 and 1986) and more suitable as the growth target.

Lamongan:

Repelita V states the growth target of Lamongan is a rate higher than the national target of 5.0% per year during Repelita V, while applying 4.5% per year to projecting GRDP. The study adopts 5.0% per year as representing a minimum rate of growth to be attained.

Growth Rates between 1994 - 1999 and 1999 - 2004

Annual growth rates of GRDP in the 1994-1999 and 1999-2004 periods are set in such a manner as to represent projected industrial growth directions in GKS as presented in Figure 2.3.3. For areas where major industrial growth is unlikely to take place, the growth rate set for the Repelita V period was assumed to continue until 2004.

^{/1} In Sidoarjo, average number of industrial investment (PMA and PMDN) acquiring approval from BKPM ranged between 2.8 and 4.6 project per year until 1986, but sharply rose to 8 in 1987 and 16 in 1988. For non-PMA/PMDN projects, annual number of projects went up from 4 in 1985 and 1986 each to 19, 12 and 20 in 1987, 1988 and 1989 respectively.

The following explain the assumptions underlying the growth rates of each area.

Gresik:

Growth accelerates in Repelita VI. The growth rate of 8.0% per year is set as a rate high enough to lead economic growth of GKS and comparable with Sidoarjo during Repelita VI.

Bangkalan:

Growth accelerates in Repelita VII as the Surabaya - Madura Bridge starts influencing investment location in favor of Bangkalan. Though Bangkalan is endowed with high growth potentials, its comparative advantages for industrial location still likely lag behind Gresik at this stage. Considering this, the rate of 6.9% per year, the average rate of GKS during Repelita V, was adopted as a rate higher than the Bangkalan's Repelita V target but lower than Gresik's during Repelita VII.

Kabupaten and Kotamadya Mojokerto/Jombang:

The growth rates in these areas are assumed to remain constant at the rates assumed for the Repelita V period. The basic functions of Kab. Mojokerto and Jombang as agriculture areas are likely to remain unchanged throughout the study period.

Surabaya:

The growth rate of 7.2% per year projected for Repelita V is assumed to continue until 2004. During the study period, Surabaya would continue to play the leading role in the economic growth of East Java and eastern parts of Indonesia. Surabaya would enhance its function as the regional center of commercial, financial and business activities.

Sidoarjo:

The growth rate of Sidoarjo is assumed to gradually fall from the high rate of 9.7% per year in Repelita V in the following Repelita periods. The rate assumed for Repelita VII (6.8% per year) is the average growth rate of GKS during Repelita V. Trend in industrial growth in Sidoarjo will shift from quantitative expansion in the Repelita IV and V periods to qualitative transformation to high-technology oriented industries in Repelita VI and VII.

Lamongan:

The growth rates of Lamongan's economy are set at 5.0% per year during Repelita VI and VII. The basic function of Lamongan is assumed to be agriculture production.

As influenced by Gresik's fast growth, Lamongan might start industrial development in Repelita VII. It is assumed, however, the industrial growth would be at the initial level still too low to influence GRDP growth rate.

Based on the assumptions thus established, GRDP in the objective area are estimated and projected for 1989, 1994, 1999 and 2004 in 1980 price. The projected GRDP are presented in Table 2.3.3 and summarized as below.

Projected GRDP in 1980 Price
(Unit : billion Rupiahs)

Year	GKS	Jombang	Total
1989	3,111	201	3,312
1994	4,333	257	4,590
1999	6,103	327	6,430
2004	8,554	418	8,972

For the purpose of telecommunications demand projection, projected GRDP in 1980 price were converted to GRDP in 1975 price by applying GRDP deflator for East Jawa. Since GRDP deflators for respective kabupaten and kotamadya were available only for years after 1980, GRDP deflator for East Jawa Province was used as proxy. The deflator in 1980 was 207.5 relative to 100 in 1975. GRDPs in 1975 price are presented in Table 2.3.4.

(4) GRDP per capita

Based on the projected population and GRDP, GRDP per capita are calculated for respective kabupaten and kotamadya as shown in Table 2.3.5. The projection shows GRDP per capita of GKS grows by 4.7 percent per year between 1989 and 2004. GRDP per capita are projected to grow at high rates in areas where major industrial growth is assumed to take place, such as Gresik (5.0%/year) and Sidoarjo (5.5%/year). High growth rate in Bangkalan is due to high GRDP growth assumed relatively to slow population growth. In areas where the agriculture sector is assumed to stay as the main sector, such as Mojokerto and Jombang, GRDP per capita is projected to grow more slowly than other areas.

Table 2.3.2 Projected Population in the Objective Area until 2004

Area	Assumed Growth Rate by 10-year Period (%/year)		
	1980-1990	1990-2000	2000-2004
Gresik	1.9	1.8	1.7
Bangkalan	0.8	0.7	0.6
Mojokerto(kodya&Kab)	1.9	1.9	1.9
Surabaya	2.9	2.9	2.9
Sidoarjo	2.7	2.6	2.5
Lamongan	1.5	1.4	1.3
Jombang	1.5	1.4	1.3

	Projected Population (in thousands)				
	1985	1989	1994	1999	2004
Gresik	800	863	944	1,032	1,124
Bangkalan	717	740	767	794	819
Mojokerto(Kab)	757	816	897	985	1,082
Mojokerto(Kodya)	92	99	109	120	132
Surabaya	2,340	2,623	3,027	3,492	4,028
Sidoarjo	976	1,086	1,236	1,405	1,591
Lamongan	1,131	1,200	1,288	1,381	1,474
GKS	6,813	7,428	8,267	9,209	10,251
Jombang	1,017	1,079	1,158	1,242	1,326
Total	7,830	8,507	9,425	10,450	11,577

	Annual Growth Rate by Repelita (%/year)			
	V	VI	VII	V to VII
	(1989-94)	(1994-99)	(1999-04)	(1989-04)
Gresik	1.8	1.8	1.7	1.8
Bangkalan	0.7	0.7	0.6	0.7
Mojokerto(Kab)	1.9	1.9	1.9	1.9
Mojokerto(Kodya)	1.9	1.9	1.9	1.9
Surabaya	2.9	2.9	2.9	2.9
Sidoarjo	2.6	2.6	2.5	2.6
Lamongan	1.4	1.4	1.3	1.4
GKS	2.2	2.2	2.2	2.2
Jombang	1.4	1.4	1.3	1.4
Total	2.1	2.1	2.1	2.1

Source : Population figures in 1985 are from SUPAS (Inter-census Survey.)

Notes : Population growth rates of Kodya Mojokerto and Kabupaten Mojokerto were set based on the past trend of the sum of the kabupaten and kotamadya to avoid impact of the change in kodya Mojokerto's boundary in 1983.

Table 2.3.3 Projected GRDP in the Objective Area until 2004
in 1980 Price

Area	kodya/ kab	Actual and Assumed Growth Rate (%/year)				
		1980-86	1986-89	1989-94	1994-99	1999-2004
Gresik	kab	6.3	4.5	4.5	8.0	8.0
Bangkalan	kab	7.8	5.1	5.1	5.1	6.9
Mojokerto	kab	3.6	3.1	5.0	5.0	5.0
Mojokerto	kodya	8.2	6.5	6.5	6.5	6.5
Surabaya	kodya	7.0	6.7	7.2	7.2	7.2
Sidoarjo	kab	4.9	6.2	9.7	8.3	6.9
Lamongan	kab	6.7	4.5	5.0	5.0	5.0
GKS	-	6.3	5.9	6.9	7.1	7.0
Jombang	kab	4.8	2.1	5.0	5.0	5.0

		GRDP in 1980 Price (million rupiahs)				
		1986	1989	1994	1999	2004
Gresik	kab	313,665	357,944	446,063	655,413	963,017
Bangkalan	kab	145,804	169,269	217,066	278,359	387,731
Mojokerto	kab	152,778	167,431	213,690	272,728	348,078
Mojokerto	kodya	32,597	39,376	53,948	73,913	101,268
Surabaya	kodya	1,441,929	1,751,609	2,479,768	3,510,629	4,970,029
Sidoarjo	kab	333,127	399,010	633,894	943,374	1,314,043
Lamongan	kab	198,049	226,007	288,448	368,141	469,852
GKS	-	2,617,949	3,110,645	4,332,877	6,102,558	8,554,017
Jombang	kab	188,848	200,997	256,529	327,403	417,858
Total	-	2,806,797	3,311,642	4,589,405	6,429,960	8,971,876

		(Percentage Distribution in GKS (%))				
Gresik	kab	12.0	11.5	10.3	10.7	11.3
Bangkalan	kab	5.6	5.4	5.0	4.6	4.5
Mojokerto	kab	5.8	5.4	4.9	4.5	4.1
Mojokerto	kodya	1.2	1.3	1.2	1.2	1.2
Surabaya	kodya	55.1	56.3	57.2	57.5	58.1
Sidoarjo	kab	12.7	12.8	14.6	15.5	15.4
Lamongan	kab	7.6	7.3	6.7	6.0	5.5
GKS	-	100.0	100.0	100.0	100.0	100.0

Source :

- (1) GRDP figures in 1986 are from "Produk Domestik Regional Bruto, 1983-86" by Kantor Statistik, Jawa Timur
- (2) GRDPs for other years were calculated by the Study Team according to the method explained in section 2.

Table 2.3.4 Projected GRDP in the Objective Area
until 2004 in 1975 Price

(Unit : million rupiahs)

Area	kodya/ kab	1989	1994	1999	2004
Gresik	kab	172,503	214,970	315,862	464,105
Bangkalan	kab	81,575	104,610	134,149	186,858
Mojokerto	kab	80,690	102,983	131,435	167,748
Mojokerto	kodya	18,976	25,999	35,621	48,804
Surabaya	kodya	844,149	1,195,069	1,691,870	2,395,195
Sidoarjo	kab	192,294	305,491	454,638	633,274
Lamongan	kab	108,919	139,011	177,417	226,435
GKS	-	1,499,106	2,088,133	2,940,992	4,122,418
Jombang	kab	96,866	123,628	157,785	201,378

Note :

- (1) GRDP figures in 1980 price were converted to 1975 price applying GRDP deflator for East Jawa. (1975=100, 1980=207.5)
- (2) Deflators for each kabupaten and kotamadya are not available before 1980.

Table 2.3.5 Projected GRDP Per Capita in the Objective Area
until 2004 in 1975 Price

(Unit : thousand Rupiahs)

Area	kodya/ kab	Y e a r				1989-2004 (%/yr)
		1989	1994	1999	2004	
Gresik	kab	200	228	306	413	5.0
Bangkalan	kab	110	136	169	228	5.0
Mojokerto	kab	99	115	133	155	3.0
Mojokerto	kodya	191	239	297	371	4.5
Surabaya	kodya	322	395	485	595	4.2
Sidoarjo	kab	177	247	324	398	5.5
Lamongan	kab	91	108	128	154	3.6
GKS	-	202	253	319	402	4.7
Jombang	kab	90	107	127	152	3.6
(GKS = 100)						
Gresik	kab	99	90	96	103	-
Bangkalan	kab	55	54	53	57	-
Mojokerto	kab	49	45	42	39	-
Mojokerto	kodya	95	94	93	92	-
Surabaya	kodya	159	156	152	148	-
Sidoarjo	kab	88	98	101	99	-
Lamongan	kab	45	43	40	38	-
Jombang	kab	44	42	40	38	-

Source : Study Team