REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS & HIGHWAYS

Pilot Study for the Rural Road Network Development Project

FINAL REPORT

MAIN REPORT

(VOLUME II)

FEBRUARY, 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

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JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to a request from the Government of the Republic of the Philippines, the Government of Japan decided to conduct a study on the Pilot Study for the Rural Road Network Development Project, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Philippines a study team headed by Mr. Kenichi Takebe, comprised of members from Katahira & Engineers Inc. and Nippon Engineering Consultant Co., Ltd., three times from November 1987 to December 1988.

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

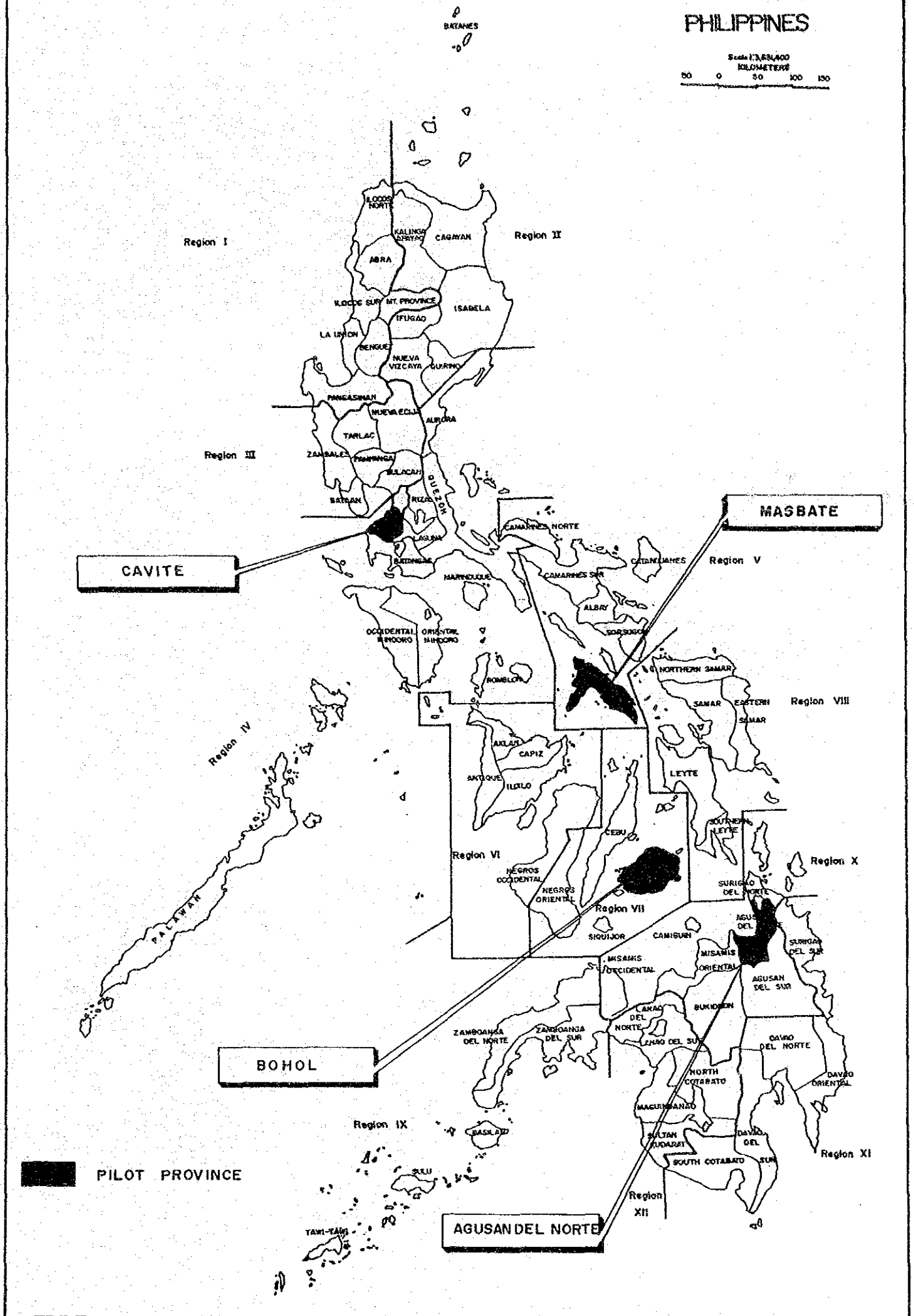
I hope that this report will contribute to the development of the Project and to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Philippines for their close cooperation extended to the team.

February, 1989

Kensuke Yanagiya

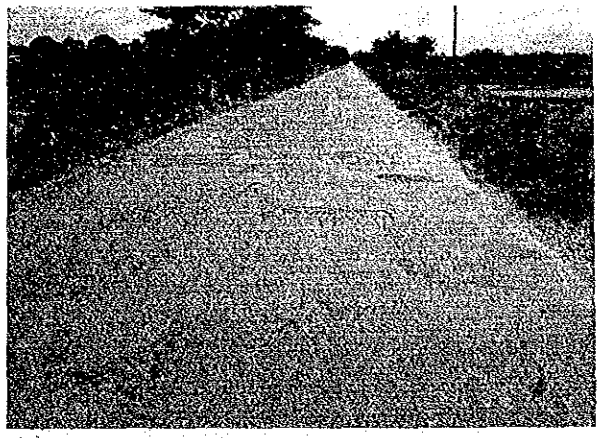
Kensuke Yanagiya
President
Japan International Cooperation Agency



PILOT STUDY
FOR
THE RURAL ROAD NETWORK DEVELOPMENT PROJECT

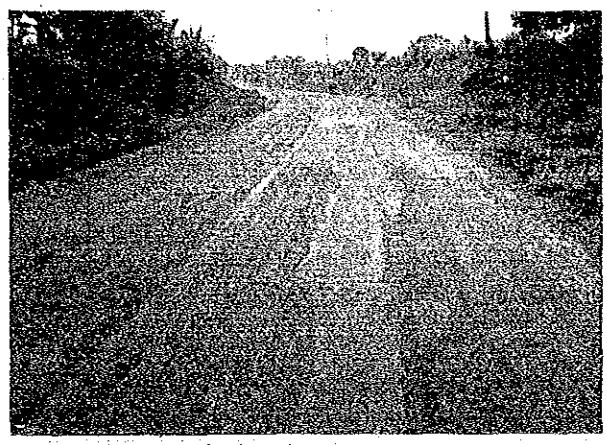
LOCATION MAP

AC pavement in "good" condition
N3-7: Tagaitay-Nasugbu



BM pavement in "bad" condition
N9-4: Noveleta-Indang-Tagaitay

National Roads



DBST pavement in "fair" condition
P19-2: Gen. Trias-Amadeo

Gravel road in "very bad" condition
P29-1: Alfonso-Maragondon

Provincial Roads

Earth road in "bad" condition
B9-3: Palindong Road

Earth road in "impassable" condition
B9-4: Panukan Gubat Road

Barangay Roads

ROADS IN CAVITE

DBST pavement in "fair" condition
N9-1: Masbate-Malinta

Gravel road in "fair" condition
N9-3: Malinta-Milagros

National Roads

Gravel road in "bad" condition
P31-1: Curvada-Pio V. Corpus

Earth road in "very bad" condition
P25-1: Jct. Bangad-Bangad

Provincial Roads

Newly constructed gravel road
B8-3: Gaid-Divisoria

Earth road in "impassable" condition
B12-1: Tabuc-Sta. Maria

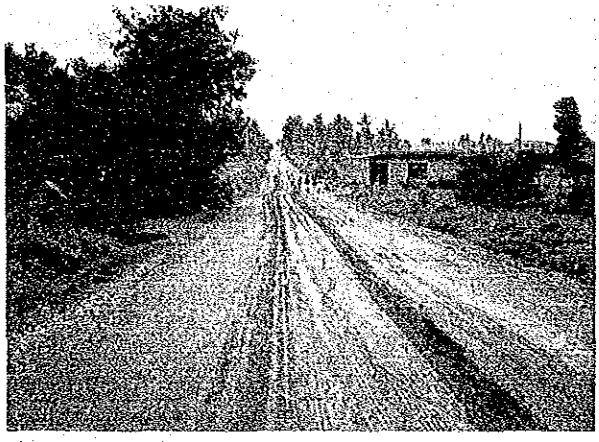
Barangay Roads

ROADS IN MASBATE

PCC pavement in "good" condition
N5-3: Cortes-Jct. Antequera

DBST pavement in "fair" condition
N5-1: Tagbilaran-Cortes

National Roads



Gravel road in "fair" condition
P108-1: Guindulman-Anda

Gravel road in "very bad" condition
P80-1: Canmanico-Anonang

Provincial Roads

PCC pavement at the barangay center is used for multipurpose
B28-5: Taug Barangay Road

Earth road in "impassable" condition
B22-2: Lobogon-Danao

Barangay Roads

ROADS IN BOHOL

PCC pavement in "good" condition
N1-1: Agusan-Misamis Oriental

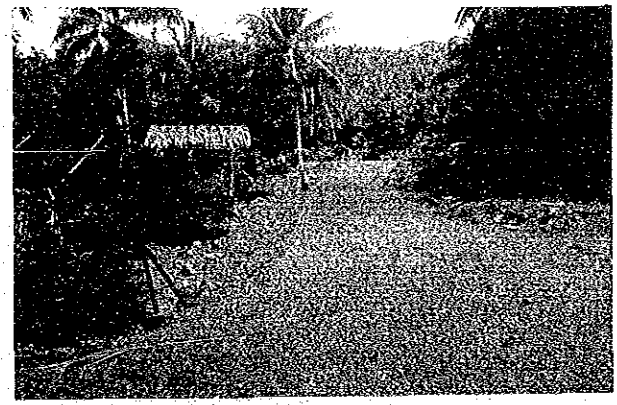
Gravel road in "bad" condition
N11-1: Jct. Tiniwisan-Maguinda

National Roads

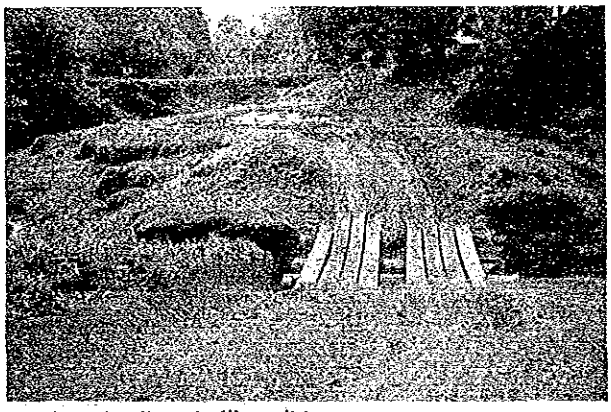
Gravel road in "bad" condition
P10-70: Duna Rosario-Tubay

Gravel road in "very bad" condition
P4-76: Jobanga-Badiang

Provincial Roads



Gravel road in "fair" condition
B10-61: Sta. Ana-Monteverde

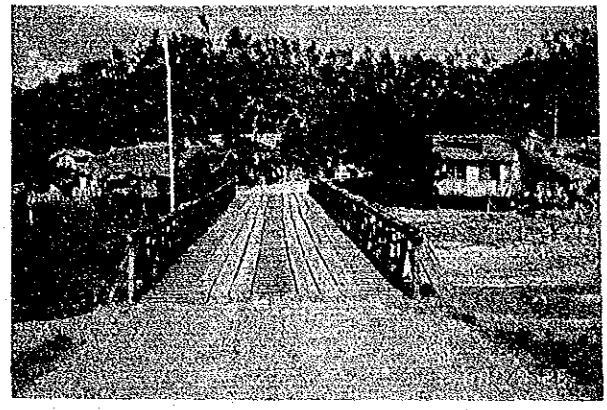


Earth road in "very bad" condition
B6-2: Mat I-Pinanaan

Barangay Roads

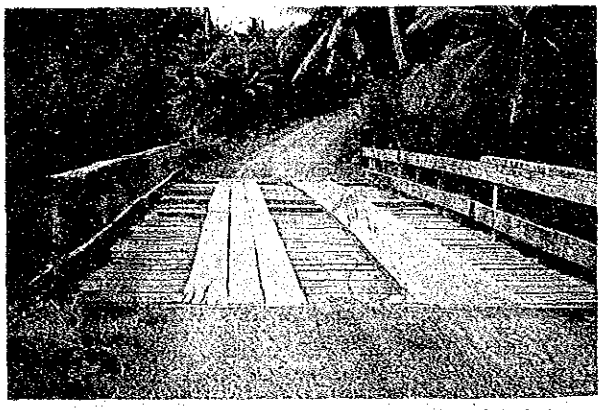
ROADS IN AGUSAN DEL NORTE

Bailey bridge over the deep valley
P27-1: Magallanes-Maragondon, Provincial road, Cavite



Single lane bailey bridge
N6-3: Masbate-Cataingan, National road, Masbate

Bailey Bridges



P124-1: Mabini-Cabulao-Lungsodaan, Provincial road, Bohol

Dilapidated timber bridge
P6-43: Jct. T-Maguinda-Lasnieves,
Provincial road, Agusan del Norte

Timber Bridges

Collapsed spillway
B0-1: Malinta-Lagta, Barangay road, Masbate

Ford crossing
B2-11: Upper Tagbongabong Road,
Barangay road, Agusan del Norte

No Existing Bridge

BRIDGES

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CURRENCY EQUIVALENTS
(As of June 1988)

₱ 1.00 = US$ 0.0467 = ¥ 6.19
US$ 1.00 = ₱ 21.00 = ¥ 130.0

ABBREVIATIONS

AADT - Average Annual Daily Traffic
AC - Asphalt Concrete Pavement
ADB - Asian Development Bank
BCGS - Bureau of Coast and Geodesic Survey
BDC - Barangay Development Council
BHS - Barangay Health Station
BMP - Bituminous Macadam Pavement
BOC - Bureau of Construction
BOD - Bureau of Design
BOE - Bureau of Equipment
BOM - Bureau of Maintenance
BOS - Bureau of Soil
CCT - Community Construction Team
CEO - City Engineer's Office
CLATT - Central Labor-based Advisory and Training Team
DBM - Department of Budget and Management
DBST - Double Bituminous Surface Treatment
DEO - District Engineer's Office
DLG - Department of Local Government
DPWH - Department of Public Works and Highways
EO - Executive Order
EMK - Equivalent Maintenance Kilometer
F/S - Feasibility Study
GDP - Gross Domestic Products
GNP - Gross National Products
GRDP - Gross Regional Domestic Products
IBRD - International Bank for Reconstruction and Development
IRR - Internal Rate of Return
JICA - Japan International Cooperation Agency
LGU - Local Government Unit
MDC - Municipal Development Council
MEO - Municipal Engineer's Office
MPDC - Municipal Planning and Development Coordinator
NALGU - National Aid to Local Government Unit
NCR - National Capital Region
NCSO - National Census and Statistic Office
NEDA - National Economic and Development Authority
OD - Origin-Destination

PBAC - Prequalification, Bids and Awards Committee
PCC - Portland Cement Concrete Pavement
PD - Presidential Decree
PDC - Provincial Development Council
PEO - Provincial Engineer's Office
PEVAC - Prequalification, Evaluation and Award Committee
PMO - Project Management Office
PPDD - Provincial Planning and Development Office
RDC - Regional Development Council
RHU - Rural Health Unit
ROW - Right-of-way

FINDINGS AND RECOMMENDATIONS

FINDINGS AND RECOMMENDATIONS

FINDINGS

1. CLASSIFICATION OF PROVINCES

73 provinces were classified by two indicators: socio-economic development (incidence of poverty) and adequacy of roads (road density).

TABLE 1-1 CLASSIFICATION OF PROVINCES BY SOCIO-ECONOMIC DEVELOPMENT AND ADEQUACY OF ROADS

Socio-economic Development (Represented by Incidence of Poverty)	Adequacy of Roads (Represented by Road Density, $L'/\sqrt{P.A}$)		
	Bad	Average	Good
Developed	[BD] ———	[AD] (4) Cavite (1) Benguet (3) Pampanga (3) Bulacan (3) Zambales (4) Laguna (1) La Union	[GD] ———
Less Developed	[BL] (4) Occidental Mindoro (2) Isabela (12) Sultan Kudarat (12) Lanao del Sur (11) Davao del Norte (2) Kalinga-Apayao (9) Zamboanga del Sur (11) Davao del Sur (9) Sulu (9) Tawi-Tawi (11) Davao Oriental (11) Surigao del Sur (12) Maguindanao (7) Negros Oriental (10) Agusan del Sur (8) Samar (4) Oriental Mindoro (4) Palawan (4) Quezon (12) North Cotabato (8) Northern Samar (8) Eastern Samar (9) Basilan (5) Masbate (4) Aurora	[AL] (4) Rizal (10) Bukidnon (1) Pangasinan (2) Quirino (2) Cagayan (3) Nueva Ecija (3) Tarlac (11) South Cotabato (1) Mountain Province (10) Agusan del Norte (7) Cebu (2) Ifugao (8) Leyte (6) Aklan (10) Misamis Oriental (5) Albay (6) Iloilo (5) Camarines Norte (8) Southern Leyte (9) Zamboanga del Norte (5) Camarines Sur (10) Surigao del Norte (5) Catanduanes (6) Capiz (6) Negros Occidental (5) Sorsogon (6) Antique (4) Marinduque	[GL] (3) Bataan (4) Batangas (2) Nueva Vizcaya (1) Ilocos Norte (1) Ilocos Sur (12) Lanao del Norte (1) Abra (2) Batanes (7) Bohol (10) Misamis Occidental (4) Romblon (7) Siquijor (10) Camiguin

Note: ( ) : Region number
L' : Fair condition road length in km
P : Population in 1,000
A : Land area in sq. km

2. SELECTION OF PILOT PROVINCES

The following provinces were selected as the "Pilot Provinces" for the Study:

TABLE 2-1 PILOT PROVINCES

Province	Characteristics
Cavite	Economically well developed Average road density, seaside, flat
Masbate	Economically less developed Low road density, island, narrow
Bohol	Economically less developed High road density, island, round
Agusan del Norte	Economically less developed Average road density, seaside, mountainous

3. ROAD LENGTH AND COST PROPOSED FOR IMPROVEMENT

The road improvement with IRR more than 15% was proposed to implement Phase I and between 7.5% to 15% for Phase II.

4 Pilot Provinces

TABLE 3-1 ROAD LENGTH AND COST FOR IMPROVEMENT

	Existing Roads (km)					
	Cavite	Masbate	Bohol	Agusan del Norte	Total	Improvemnt Cost (M₱)
National Roads	303.9	276.0	588.5	218.2	1,386.6	
Provincial/City Roads	521.1	83.9	987.6	298.9	1,891.5	
Barangay Roads	746.7	397.6	2,697.2	646.6	4,488.1	
Total	1,571.7	757.5	4,273.3	1,163.7	7,766.2	
Phase I (IRR ≥ 15)	Road Length Proposed for Improvement (km)					
Major Roads	148.9	134.5	14.7	52.6	350.7	₱621.0
Minor Roads	157.5	73.5	107.3	12.2	350.5	₱330.2
Total (%)	306.4 (19)	208.0 (27)	122.0 (3)	64.8 (6)	701.2 (9)	₱951.2
Phase II (15 > IRR ≥ 7.5)						
Major Roads	-	152.8	46.5	49.3	248.6	₱380.2
Minor Roads	113.6	28.2	83.4	48.0	273.2	₱229.0
Total (%)	113.6 (7)	181.0 (24)	129.9 (3)	97.3 (8)	521.8 (7)	₱609.2
Total (Phase I + Phase II)						
Major Roads	148.9	287.3	61.2	101.9	599.3	₱1,001.2
Minor Roads	271.1	101.7	190.7	60.2	623.7	₱ 559.2
Total (%)	420.0 (27)	389.0 (51)	251.9 (6)	162.1 (14)	1,223.0 (16)	₱1,560.4

73 Provinces

TABLE 3-2 ROAD LENGTH AND COST FOR IMPROVEMENT

	4 Pilot Provinces			73 Provinces		
	Existing Road Length (km)	Identified Road Length (km)	Improvement Cost (MP)	Existing Road Length (km)	Identified Road Length (km)	Improvemnt Cost (MP)
Phase I (IRR ≥ 15)	-	701.2	951.2	-	20,542.2	23,618.0
Phase II (15 > IRR ≥ 7.5)	-	521.8	609.2	-	18,977.4	22,111.5
Total	7,766.2	1,223.0	12,560.4	135,107.20	39,501.6	45,729.5

4. PROJECT IMPLEMENTATION

4.1 Fund Requirement

The Project may entail an annual investment of ₱5,000 million starting in 1991, about ₱1,900 million for locally funded and ₱3,100 million for foreign assisted projects. ₱2,500 million (80% of ₱3,100 million) will be funded as the foreign currency portion of the Project from international lending agencies.

4.2 Implementation Schedule

Road improvement classified as Phase I will be implemented for five (5) years from 1991 to 1995, with Phase II from 1996 to 2000.

FIGURE 4-1 IMPLEMENTATION SCHEDULE

	Investment		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	Phase I	Phase II										
Foreign Assisted Rural Roads	₱14,865M	₱13,917M	← Phase I → ₱3,147M(annual)						→ Phase II →			
Locally Funded Rural Roads	₱8,753M	₱8,196M	← ₱1,853M(annual)						→			
Total Budget for Rural Roads	₱23,618M	₱22,112M	← ₱5,000M(annual)						→			

4.3 Project Administration

- In view of the magnitude of the program, it would be advisable to create a separate office in the Department of Public Works and Highways to oversee the implementation of the Rural Road Network Development Project.

- The existing regional and district offices should be reinforced to deal with the project implementation and should supervise the design and construction of the "Administration Type" subprojects under the direct supervision of DPWH engineers.

- "Community Construction Teams" should be organized to carry out the construction work of administration type subprojects.

- The foreign currency portion of the foreign assisted projects (₱2,500 million per annum) will be prepared through the "Rural Road Development Sector Loan" system.

- Subprojects under the Project should be identified and prioritized in uniform format and procedures. The "Simplified Method" was proposed for actual application.

RECOMMENDATIONS

1. The Medium-Term Philippine Development Plan addresses the goals of the national development efforts and aims to enlarge and reinforce the physical foundation of the economy.

   Specifically, the Plan aims to install and improve the essential transport in the rural areas, giving priority to rural-based, small-and medium-sized, labor-based projects, particularly farm-to-market roads.

2. Since the early 1970's, the development program of the main road system has been pursued, and thus, the present extent of the system is in general considered quite adequate.

   However, the present condition of many roads, especially provincial and barangay roads and even some national road sections, is poor and cannot be considered to be all-weather roads.

3. Consistent with the development policy and cognizant of the present road condition, the promotion of rural road network development is recommended to contribute to the goal of the development objectives of the country.

   The Project should be implemented at the earliest possible time, utilizing at the maximum level the existing implementation institutions and procedures with the minimum modifications recommended in Section 4.

4. The Study covers only four (4) provinces among 73 in the country as the pilot provinces to exemplify the study procedures.

   The continuation of the same study, therefore, is recommended for the remaining provinces to promote balanced growth among the regions.

PART I GENERAL

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The present (1985) public road network in the Philippines consists of:

a) 26,300 km of national roads which form the main trunkline system,
b) 45,200 km of provincial, municipal and city roads, and
c) 90,200 km of barangay (or farm-to-market) roads.

Responsibility for planning, design, construction and maintenance is divided, with coordinating mechanisms, between the national government and local government agencies. In the national government, responsibility for national or main roads in the network and barangay roads is with the Department of Public Works and Highways (DPWH). The responsibility for provincial, municipal and city roads which are the secondary roads is with the provincial and local governments supervised by the Department of Local Government (DLG). The barangay road is considered as the lowest tier in the highway system of the country and functions as a penetration, feeder or farm-to-market road.

The development program of the main and secondary road system has been pursued with increased momentum starting in the early 1970's following the completion of the Philippine Transport Survey (PTS). Since then the implementation of the program has been continued with financial assistance from external sources including OECF, World Bank, ADB, USAID, OPEC and other donor countries and/or financial organizations.

The National Transport Planning Project (NTPP) recommended a new highway development program for the country starting in 1983 up to 1992. Presently, the extent of the main road network can in general be considered quite adequate in so far as providing the basic trunkline system for the country.

Equally important is the need to accelerate the development of other rural and barangay roads to spread the benefits of transport services to a large segment of the population especially in the rural areas where these are most needed to enhance development. This has gained increased significance in the light of the current thrusts towards agricultural development vis-a-vis improving the socio-economic situation in the countryside.

As an initial step in formulating a systematic plan of implementation in providing the basic road network, with emphasis on the development of rural roads in the provinces throughout the country, the Government of the Republic of the Philippines (GOP) through the Department of Public Works and Highways (DPWH) sought technical assistance from the Government of Japan (GOJ) for the conduct of a Pilot Study for the Rural Road Network Development Project (the Study).

In response to the request of GOP, GOJ decided to conduct the Study. The Japan International Cooperation Agency (JICA), which is the official agency responsible for the implementation of GOJ technical cooperation programs, organized a team of ten experts to be engaged in the Study. The JICA Study Team, in close collaboration with the DPWH Counterpart Team, commenced work in November 1987 and completed its task in February 1989.

1.2 OBJECTIVES OF THE STUDY

The objectives of the study are to:

1) Establish basic technical and administrative procedures and methods for the functional development of road networks in the rural areas.

2) Recommend a system and investment program for the implementation of rural road projects.

1.3 SCOPE OF THE STUDY

The Study was carried out in four (4) main stages as follows:

Stage 1: **Assesment of Road Development Potentiality**

The road developmnent potentiality was evaluated for all provinces, and four (4) provinces were selected as pilot provinces.

Stage 2: **Project Identification and Screening**

In the pilot provinces selected in Stage 1, the road projects were identified and high priority projects were selected for detailed evaluation.

Stage 3: **Project Evaluation**

The road projects selected in Stage 2 were evaluated from the technical, social and economic points of view.

Stage 4: **Study on Project Implementation**

On the basis of the assessments and analyses made in the previous stages, an effective system for the project implementation was studied.

The Study covered all roads except national primary roads defined in Executive Order No. 113 "Establishing the Classification of Roads" and roads serving as streets within built-up population centers. The Study dealt with rehabilitation/improvement/construction of roads and replacement/construction of bridges.

The Study flow diagram is presented in Figure 1.3-1.

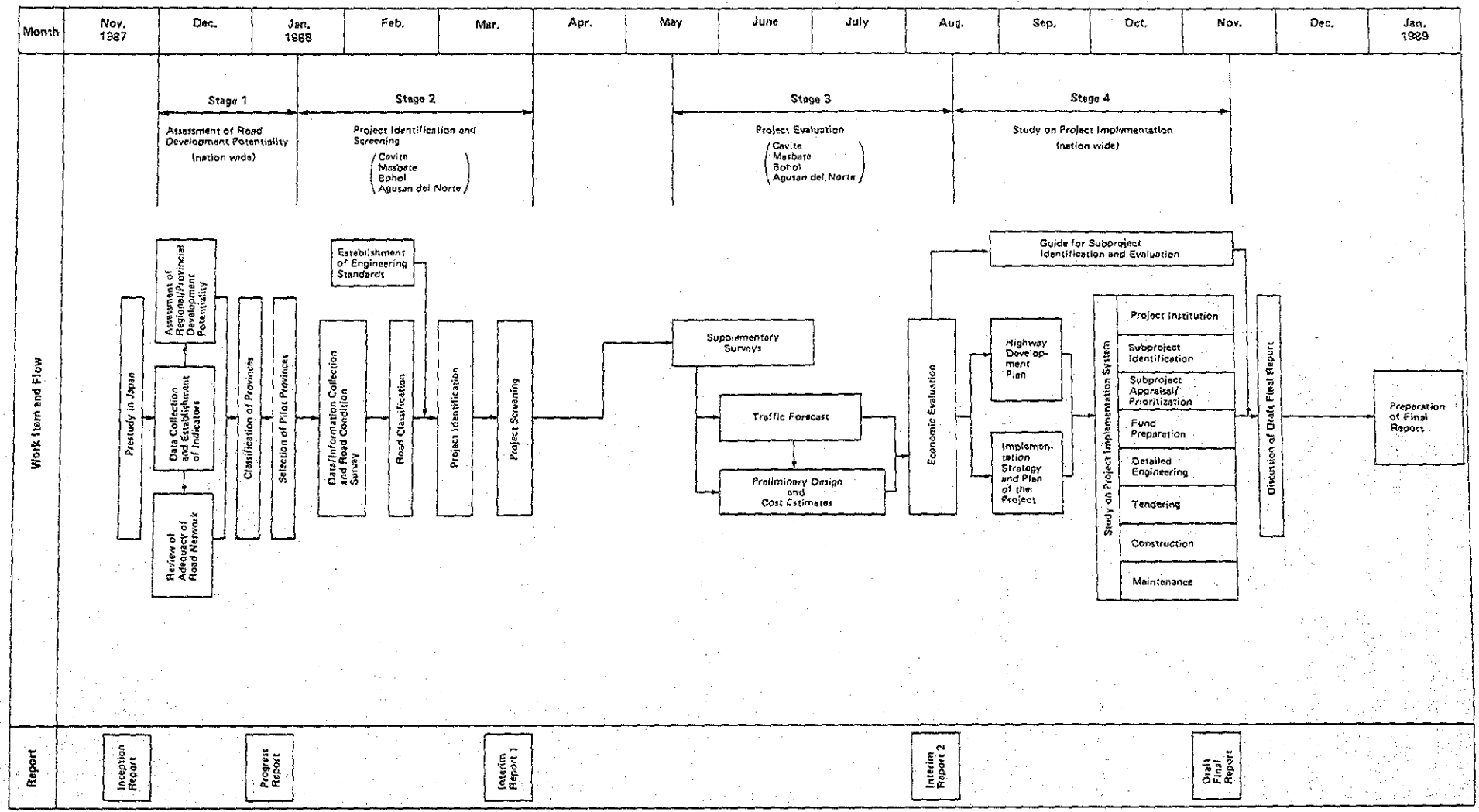


FIGURE 1.3-1 STUDY FLOW DIAGRAM

1.4 ORGANIZATION FOR EXECUTING THE STUDY

The Study was undertaken jointly by the JICA Study Team and the DPWH Counterpart Team. The Study Team was guided by the DPWH Steering Committee and the JICA Advisory Committee.

The organization chart is shown in Figure 1.4-1.

The members participating in the Study are listed below:

1) DPWH Steering Committee

Chairman	Teodoro T. Encarnacion
Member	Manuel M. Bonoan
Member	Leonardo Nunez
Member	Francisco N. Pascual
Member	Edmundo V. Mir
Member	Jose Salvador
Member	Hideo Tsuji

2) DPWH Counterpart Team

Team Leader	Jose P. Gloria
Project Coordinator/ Highway Planner	Geronimo S. Alonzo
Traffic Engineer	Cesario C. Vicente
Maintenance Engineer	Danilo A. Madamba
Highway Engineer, Cavite Group	Corazon E. Arceta
Highway Engineer, Cavite Group	Edwin M. Fortes
Highway Engineer, Cavite Group	Shirley O. Castro
Highway Engineer, Cavite Group	Loreto M. Tapalla
Highway Engineer, Agusan del Norte Group	Evelyn L. Beray
Highway Engineer, Agusan del Norte Group	Edgar Llanera
Highway Engineer, Bohol Group	Glory M. Manuva
Highway Engineer, Bohol Group	Sukarno Tiannok
Highway Engineer, Bohol Group	Rico De La Rosa
Highway Engineer, Bohol Group	Amari A. Crus
Highway Engineer, Masbate Group	Filomena Arenas
Highway Engineer, Masbate Group	Efren N. Guevarra
Agusan del Norte District Engr.	Orlando O. Mancao
General Economist	Aniceta Mago

3) JICA Advisory Committee

Chairman	Masao Shibata
Member	Minoru Ishida
Member	Takuo Baba
Member	Masamichi Sano
JICA Project Officer	Tadashi Shinoura
JICA Project Officer	Kazuo Nakagawa
JICA Project Officer	Masaru Suzuki
JICA Project Officer	Hiroshi Yamamoto
JICA Project Officer	Hiroki Ebara

4) JICA Study Team

Team Leader	Kenichi Takebe
Deputy Team Leader/ Administration Expert	Tsuneo Bekki
Highway Planner	Mitsuo Hatakeyama
Regional Planner/ Transport Economist	Kunihiko Sawano
Highway Engineer	Akira Takaku
Highway Engineer	Soemu Oshita
Highway Engineer	Osamu Sato
Highway Engineer	Nobuyuki Uchida
Maintenance/ Rehabilitation Expert	Masao Yamazaki
Management/ Operation Expert	Sumio Akutsu

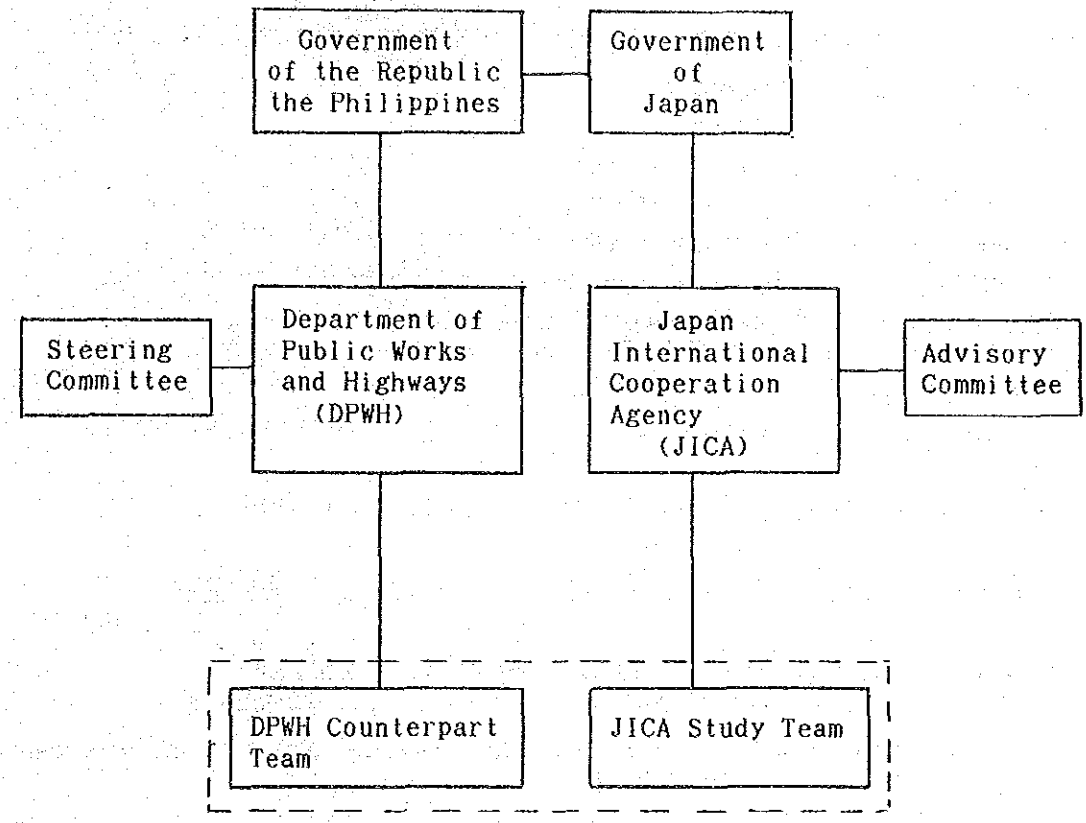


FIGURE 1.4-1 ORGANIZATION CHART

1.5 REPORTS

1.5.1 Organization of the Final Report

The final report is organized with the following:

Volume I	:	Executive Summary
Volume II	:	Main Report
Volume III	:	Appendix
Volume IV	:	Drawings 1 (Cavite)
Volume V	:	Drawings 2 (Masbate)
Volume VI	:	Drawings 3 (Bohol)
Volume VII	:	Drawings 4 (Agusan del Norte)
Volume VIII	:	Guide for Subproject Identification and Evaluation

1.5.2 Organization of the Main Text

Part I General

Part I gives the background, objectives, scope and organization of the Study.

Part II Assessment of Road Development Potentiality

Part II describes the findings of Stage 1 of the Study. The major activities in this stage were as follows:

- Data collection and establishment of indicators (Chapter 2)
- Assessment of regional/provincial development potentiality (Chapter 3)
- Review of adequacy of road network (Chapter 4)
- Classification of provinces (Chapter 5)
- Selection of pilot provinces (Chapter 6)

Part III Project Identification and Screening

Part III outlines the results of Stage 2 of the Study. The following activities were included in this stage:

- Data/information collection and road condition survey
- Road classification
- Establishment of engineering standards
- Project identification
- Project screening

The project identification and screening methodology is presented in Chapter 7, while the results of the project identification and screening in the pilot provinces are summarized in Chapter 8.

Part IV Project Evaluation

Part IV describes the results of Stage 3 of the Study. The major activities in this stage were as follows:

- Supplementary surveys
- Traffic forecast
- Preliminary design and cost estimates
- Economic evaluation

Chapter 9 presents the project evaluation methodology. The provincial profile, assessment of present road network and project evaluation are outlined in Chapters 10 to 13 for the pilot provinces: Cavite, Masbate, Bohol and Agusan del Norte, respectively.

Part V Study on Project Implementation

Part V contains the findings of stage 4 of the Study. The major activities in this stage were as follows:

- Preparation of guide for subproject identification and evaluation (Chapter 17.2 and Chapter 18.5)
- Study on highway development plan (Chapter 14)
- Study on implementation strategy and plan of the project (Chapter 15)
- Study on project implementation system, including:
  - Project institution (Chapter 16)
  - Subproject identification (Chapter 17)
  - Subproject appraisal/prioritization (Chapter 18)
  - Fund preparation (Chapter 19)
  - Detailed engineering (Chapter 20)
  - Tendering (Chapter 21)
  - Construction (Chapter 22)
  - Maintenance (Chapter 23).

PART II
ASSESSMENT OF ROAD DEVELOPMENT POTENTIALITY

CHAPTER 2

BASIC DATA AND INDICATORS BY PROVINCE

For the assessment of the road development potentialities by province, basic data were collected. Based thereupon, various indicators were established and calculated. This chapter presents the collected data and the definitions of the indicators.

2.1 BASIC DATA

Since the assessment of the road development potentiality is to be made by province, basic data were collected and compiled by province, wherein the subprovinces of Guimaras and Biliran were attached to the provinces of Iloilo and Leyte, respectively; therefore, the provinces numbered 73. The basic data collected and compiled are listed as follows (refer to Appendix 2-1):

1) Physical and Demographic Data

Data	Year	Data Source
a) Total Land Area in km^2	-	DPWH Infrastructure Atlas, 1986
b) Arable Area in km^2 (suited to cultivation and other uses with slops ranging from 0 to 18%)	-	DPWH Infrastructure Atlas, 1986
c) Distance to Metro Manila/ Cebu City/Davao City in km (distance from a province to Metro Manila, Cebu City or Davao City, whichever is nearest, adding 100 km for a province not connected by land)	-	Study Team
d) Population	1975	1975 Census of Population and Housing, NCSO
e) Projected Population	1985	NCSO
f) Projected Urban/Rural Population	1985	NCSO

2) Economic Data

Data	Year	Data Source
a) Gross Regional Domestic Product at current price in million pesos	1985	NEDA
b) Per Capita Income in pesos per person	1985	1985 Family Income and Expenditures Survey, NCSO
c) Number of Workers by Industrial Sector	1980	1980 Census of Population and Housing, NCSO
d) Un and Underemployment Rate in %	1986	NCSO

3) Agricultural Data

Data	Year	Data Source
a) Total Agricultural Area in hectares	1980	b) + c) below
b) Farm Area in hectares	1980	1986 Philippine Statistical Yearbook, NEDA
c) Unutilized Area (with potential for agricultural use) in hectares	1980	National Land Use Committee, NEDA
d) Crop Area of Palay, Corn, Sugarcane and Coconut in hectares	1980	1980 Census of Agriculture, NCSO
e) Production of Palay (in tons), Corn (in tons), Sugar (in kg) and Coconut (in 1,000 nuts)	1980	1980 Census of Agriculture, NCSO

4) Social Data

Data	Year	Data Source
a) Number of Elementary Classrooms	School Year 1984-85	DPWH, Infrastructure Atlas, 1986
b) Number of Hospital Beds	1985	DPWH, Infrastructure Atlas, 1986
c) Incidence of Poverty in % of the total number of families below the poverty line	1985	Medium-Term Philippine Development Plan (1987-1992) and 1985 Family Income and Expenditure Survey, NCSO

5) Road Data

Data	Year	Data Source
a) Length of National Roads by Type of Surface	1985	DPWH, Infrastructure Atlas, 1986
b) Length of Provincial Roads by Type of Surface	1985	DPWH, Infrastructure Atlas, 1986
c) Length of City Roads by Type of Surface	1985	DPWH, Infrastructure Atlas, 1986
d) Length of Municipal Roads by Type of Surface	1985	DPWH, Infrastructure Atlas, 1986
e) Length of Barangay Roads by Type of Surface	1985	DPWH, Infrastructure Atlas, 1986

The basic data are shown in Appendix 2-1, of which major data are presented in Table 2.1-1.

TABLE 2.1-1 MAJOR BASIC DATA BY PROVINCE

	Land Area (km2)	Farm Area (km2)	Road Length (km) Total	Road Length (km) Fair Condition	Population 1985	No. of Workers 1980	GRDP (Mp)	Incidence of Poverty (%)
All Philippines	299,970.4	90,112.0	161,710.2	42,019.8	54,668,749	14,197,122	610,062	59.3
NCR	636.0	481.0	2,939.1	2,019.4	6,942,204	2,096,433	174,379	44.1
Region I	21,568.5	3,735.0	17,990.7	4,346.3	3,902,577	988,785	27,202	52.3
Abra	3,975.6	240.0	2,837.7	508.8	176,689	46,163	1,132	66.6
Benguet	2,655.4	426.0	1,857.4	509.2	408,973	114,712	3,566	36.1
Ilocos Norte	3,399.3	405.0	3,230.0	802.4	425,005	109,118	2,833	54.6
Ilocos Sur	2,579.6	434.0	2,874.3	605.5	487,987	127,387	3,311	62.4
La Union	1,493.1	411.0	1,314.3	393.4	508,316	122,237	3,402	42.8
Mountain Province	2,097.3	192.0	820.7	197.4	110,059	40,238	920	57.1
Pangasinan	5,368.2	1,627.0	5,056.3	1,329.7	1,785,548	428,930	12,038	53.7
Region II	36,403.1	5,682.0	13,167.0	3,124.9	2,520,978	642,475	17,785	54.6
Batanes	209.3	45.0	277.0	67.8	12,979	4,379	99	74.2
Cagayan	9,002.7	1,475.0	3,581.8	918.7	795,277	198,162	5,546	55.0
Ifugao	2,517.8	335.0	989.8	212.9	122,898	46,478	1,129	66.3
Isabela	10,664.6	2,223.0	3,741.0	940.0	998,984	242,666	6,920	51.7
Kalinga-Apayao	7,047.6	786.0	1,300.3	261.1	211,061	57,260	1,420	60.5
Nueva Vizcaya	3,903.9	568.0	2,583.7	545.7	279,441	69,113	2,029	52.4
Quirino	3,057.2	250.0	693.4	178.7	100,338	24,417	642	53.7
Region III	18,230.8	4,685.0	13,312.8	4,004.5	5,456,130	1,388,123	60,501	44.4
Bataan	1,373.0	207.0	1,076.7	421.9	385,479	101,623	4,801	47.2
Bulacan	2,625.0	667.0	2,629.9	866.5	1,265,541	356,425	17,032	36.5
Nueva Ecija	5,284.3	1,837.0	3,252.5	941.7	1,194,410	282,380	10,353	55.1
Pampanga	2,180.7	717.0	2,409.2	697.7	1,346,340	328,794	15,137	36.5
Tarlac	3,053.4	971.0	2,643.1	664.1	757,377	191,166	7,655	56.2
Zambales	3,714.4	286.0	1,301.4	412.5	506,983	127,735	5,523	38.3
Region IV	46,924.2	11,263.0	18,919.9	5,372.7	7,089,369	1,823,029	91,073	55.9
Aurora	3,239.6	276.0	831.2	158.1	127,969	30,072	1,174	82.0
Batangas	3,165.8	1,273.0	3,663.4	1,014.0	1,312,287	362,531	18,491	52.4
Cavite	1,287.6	478.0	1,639.6	557.9	933,553	252,059	14,332	31.4
Laguna	1,759.7	674.0	1,474.3	618.3	1,142,909	304,582	17,038	38.8
Marinduque	959.2	338.0	666.3	198.1	191,448	45,654	2,035	82.5
Occidental Mindoro	5,879.9	940.0	1,611.6	358.5	255,772	60,299	2,364	51.6
Oriental Mindoro	4,364.7	1,285.0	1,355.7	417.4	518,615	117,452	4,579	70.5
Palawan	14,896.3	2,034.0	3,086.8	593.5	438,801	105,260	4,077	72.0
Quezon	8,706.6	3,200.0	2,128.2	724.7	1,286,791	325,594	13,846	72.5
Rizal	1,308.9	280.0	1,227.9	416.3	673,066	171,348	10,739	49.7
Romblon	1,355.9	485.0	1,434.9	315.8	208,158	52,178	2,398	83.0
Region V	17,632.5	9,456.0	6,878.3	2,746.0	3,921,555	920,308	20,750	73.2
Albay	2,552.6	1,451.0	1,691.3	584.4	906,215	230,285	5,381	68.8
Camarines Norte	2,112.5	1,065.0	729.1	296.9	352,054	81,529	1,908	69.6
Camarines Sur	5,266.8	2,609.0	3,463.8	976.9	1,247,063	283,934	6,428	71.5
Catanduanes	1,511.3	406.0	835.9	217.9	192,833	44,386	1,002	72.1
Masbate	4,045.7	2,592.0	1,053.8	266.0	656,623	149,941	3,161	78.9
Sorsogon	2,141.4	1,333.0	1,104.4	403.9	566,767	130,233	2,870	79.5
Region VI	20,223.2	7,458.0	13,301.0	3,539.0	5,092,415	1,320,033	45,671	73.1
Aklan	1,817.9	445.0	1,226.2	308.1	363,320	96,444	3,466	68.2
Antique	2,522.0	681.0	1,341.7	336.2	388,294	98,319	3,264	80.1
Capiz	2,633.2	869.0	1,745.6	429.3	558,745	141,679	4,623	74.0
Iloilo	5,324.0	2,462.0	4,192.9	1,134.6	1,595,198	412,539	14,252	69.4
Negros Occidental	7,926.1	3,001.0	4,794.6	1,331.8	2,186,858	571,054	20,066	75.1
Region VII	14,951.5	5,297.0	11,111.8	2,867.5	4,195,009	1,236,141	41,710	68.8
Bohol	4,117.3	1,383.0	4,561.6	1,028.2	871,898	244,970	7,419	74.8
Cebu	5,088.4	1,633.0	4,090.2	1,181.6	2,329,803	707,639	27,153	66.2
Negros Oriental	5,402.3	2,205.0	2,088.6	548.4	917,416	262,012	6,581	68.5
Siquijor	343.5	76.0	371.4	109.5	75,892	21,520	557	86.9
Region VIII	21,431.7	6,457.0	9,321.5	2,641.3	3,072,760	788,603	13,607	70.4
Leyte	6,268.3	2,740.0	4,602.0	1,302.1	1,428,321	373,727	8,651	68.0
Southern Leyte	1,734.8	645.0	1,352.6	369.3	334,273	81,904	1,403	69.9
Eastern Samar	4,339.6	784.0	1,616.1	365.4	357,623	86,668	1,465	76.6
Northern Samar	3,498.0	1,292.0	826.2	211.0	429,760	98,388	1,628	74.9
Samar	5,591.0	996.0	914.6	393.6	522,783	147,916	2,460	69.6
Region IX	18,685.1	7,698.0	9,201.6	2,051.5	2,862,983	681,943	21,187	65.3
Basilan	1,327.2	663.0	677.1	135.3	229,951	52,136	1,395	78.4
Sulu	1,600.4	988.0	799.1	205.2	404,800	99,246	2,975	63.0
Tawi-Tawi	1,087.4	385.0	332.5	70.4	217,957	42,757	1,262	66.0
Zamboanga del Norte	6,075.2	2,259.0	3,102.9	692.5	660,465	160,746	4,882	70.6
Zamboanga del Sur	8,594.9	3,403.0	4,290.0	948.0	1,349,810	327,058	10,473	60.9
Region X	28,327.8	8,923.0	15,984.0	3,661.0	3,178,586	762,706	30,486	66.2
Agusan del Norte	2,590.3	871.0	1,255.0	390.3	419,937	98,897	4,697	64.1
Agusan del Sur	8,965.5	1,261.0	1,763.1	449.9	310,463	69,133	2,207	68.7
Bukidnon	8,293.8	3,313.0	5,132.0	985.7	725,784	170,671	5,540	51.6
Camiguin	229.8	107.0	430.9	101.3	60,865	16,293	616	88.3
Misamis Occidental	1,939.3	862.0	2,430.4	486.7	433,843	112,274	4,570	78.4
Misamis Oriental	3,570.1	1,565.0	3,267.4	817.6	807,237	198,408	9,206	68.3
Surigao del Norte	2,739.0	944.0	1,705.2	429.5	420,457	97,030	3,650	71.6
Region XI	31,662.9	10,863.0	15,792.3	3,369.7	3,836,461	948,917	42,441	61.7
Davao del Norte	8,129.8	2,629.0	2,952.2	732.3	817,601	209,409	8,358	59.9
Davao del Sur	6,377.6	2,876.0	3,979.8	884.9	1,315,187	335,885	17,056	62.5
Davao Oriental	5,164.5	1,554.0	1,400.6	323.7	386,800	89,509	3,446	66.8
South Cotabato	7,468.8	2,488.0	5,934.9	1,061.5	881,136	212,661	9,111	57.1
Surigao del Sur	4,522.2	1,316.0	1,524.8	367.4	435,737	101,453	4,470	67.7
Region XII	23,293.1	8,114.0	11,790.2	2,275.9	2,597,722	597,624	23,270	65.2
Lanao del Norte	3,092.0	1,385.0	4,536.5	758.9	531,397	130,500	5,572	65.3
Lanao del Sur	3,872.9	1,459.0	1,878.5	384.6	445,791	97,746	4,229	56.0
Maguindanao	5,474.1	1,676.0	2,082.5	494.9	602,829	139,261	5,283	68.4
North Cotabato	6,565.9	2,443.0	1,518.1	354.0	657,513	152,175	5,409	74.3
Sultan Kudarat	4,288.2	1,151.0	1,774.6	283.6	360,192	77,942	2,777	54.8

2.2 VARIOUS INDICATORS

Various indicators were developed in order to assess provincial development potentiality and to review the adequacy of the road network as well as to classify provinces. Since the reasons why these indicators were developed and selected and their interpretations are discussed in Chapters 3 and 4, only definitions are presented in this Chapter. Values of these indicators are shown in Appendix 2-2 and also shown graphically in Appendix 2-3.

1) Physical and Demographic Indicators

a) Topographical Classification

Provinces were classified based on geographic and topographical characteristics by the Study Team into six (6) groups as follows:

- Inland Province with mostly mountainous terrain (abbreviated as "Inl'd. Mt" in Appendix 2-2)
- Inland Province with relatively flat plain ("Inl'd. Fl")
- Seaside Province with narrow plain along the sea and with mountainous hinterland ("Sea'd. Mt")
- Seaside Province with relatively flat plain (Sea'd. Fl")
- Province composed of round-shape island(s) ("Isl'd. Rd")
- Province composed of narrow and long island(s) (Isl'd. Nr")

b) Arable Area Ratio

$$\text{Arable Area Ratio (\%)} = \frac{\text{Arable Area}(km^2)}{\text{Total Area } (km^2)} \times 100$$

c) Population Density

$$\text{Population Density (persons/km}^2) = \frac{\text{Population (Persons)}}{\text{Total Area } (km^2)}$$

d) Arable Area Population Density

$$\text{Arable Area Population Density (persons/km}^2) = \frac{\text{Population(Persons)}}{\text{Arable Area } (km^2)}$$

e) Urban Population Ratio

$$\text{Urban Population Ratio (\%)} = \frac{\text{Urban Population}}{\text{Total Population}} \times 100$$

f) Population Growth Rate

Average Annual Population Growth Rate in % per annum for the period 1975 to 1985

2) Economic Indicators

a) Per Capita GRDP

$$\text{Per Capita GRDP (₱/person)} = \frac{\text{GRDP (₱)}}{\text{Population (persons)}}$$

b) Land Productivity

$$\text{Land Productivity (1000₱/km}^2\text{)} = \frac{\text{GRDP (1000₱)}}{\text{Total Area (km}^2\text{)}}$$

c) Per Capita Income

$$\text{Per Capita Income (₱/person)} = \frac{\text{Total Family Income (₱)}}{\text{Population (persons)}}$$

d) Primary or Secondary or Tertiary Sector Worker Ratio

Primary (or Secondary or Tertiary) Sector Worker Ratio (%)

$$= \frac{\text{No. of Primary (or Secondary or Tertiary) Sector Workers}}{\text{Total No. of Workers}} \times 100$$

e) Unemployment Ratio

$$\text{Unemployment Ratio (\%)} = \frac{\text{No. of Unemployed Persons}}{\text{Total Work Force (persons)}} \times 100$$

f) Underemployment Ratio

$$\text{Underemployment Ratio (\%)} = \frac{\text{No. of Underemployed Persons}}{\text{Total Work Force (persons)}} \times 100$$

g) Un and Underemployment Ratio

Un and Underemployment Ratio (%) = e) + f)

3) Social Indicators

a) Elementary Classroom Ratio

Elementary Classroom Ratio (Classrooms/1000 persons)

$$= \frac{\text{No. of Elementary Classrooms}}{\text{Population (1000 persons)}}$$

b) Hospital Bed Ratio

$$\text{Hospital Bed Ratio (Beds/1000 persons)} = \frac{\text{No. of Hospital Beds}}{\text{Population (1000 persons)}}$$

c) Social Facility Ratio

$$\text{Social Facility Ratio} = \frac{1}{2}\left[\frac{\text{Elementary Classroom Ratio of a Province}}{\text{National Average}} + \frac{\text{Hospital Bed Ratio of a Province}}{\text{National Average}}\right]$$

d) Incidence of Poverty

Incidence of Poverty (%)

$$= \frac{\text{No. of Families Below the Poverty Line}}{\text{Total No. of Families}} \times 100$$

The poverty line is defined as the monthly income required to satisfy 100% of the nutritional requirements and other needs of a family of six (6). According to the Interagency Working Group on Poverty Determination, NEDA, FNRI and NCSO, the poverty lines in 1985 were as follows:

Philippines	2,382 ₱
NCR	3,282
Region I	2,374
II	2,194
III	2,550
IV	2,471
V	2,148
VI	2,449
VII	1,982
VIII	2,016
IX	2,118
X	2,262
XI	2,388
XII	2,233

4) Agricultural Indicators

a) Major Crop

The major crops of provinces is defined by the Study Team as four (4) crops: palay, corn, sugarcane and coconut, which has the highest share in the area harvested.

b) Yield (or Land Productivity)

$$\text{Yield} = \frac{\text{Production}}{\text{Area Harvested}}$$

Yield for palay	:	ton/ha
corn	:	ton/ha
sugarcane	:	kg/ha
coconut	:	nuts/tree

c) Unutilized Agricultural Area Ratio

$$\text{Unutilized Agricultural Area Ratio (\%)} = \frac{\text{Unutilized Area (ha)}}{\text{Total Agricultural Area (ha)}} \times 100$$

d) Accessibility to Metro Manila/Cebu City/Davao City

$$\text{Accessibility} = \frac{l\,\text{m}}{l + l\,\text{m}}$$

where : l = Distance from a province to Metro Manila, Cebu City or Davao City, whichever is nearest, adding 100 km for a province not connected by land.

$l\,\text{m}$ = Average distance

e) Agricultural Productivity (1)

Agricultural productivity (1) is defined by the Study Team as follows:

$$\text{Agricultural Productivity (1)} = \sum_{i=1}^{4}\left(\alpha i \times \frac{Yi}{Yi.\ max}\right) \times 100$$

where : αi = $\dfrac{\text{Area Harvested of Crop i}}{\text{Total Area Harvested of 4 Crops}}$

Yi = Yield of crop i

Yi, max = Present maximum yield level of crop i in the Philippines

For palay, Y1, max = 3.3 ton/ha
corn, Y2, max = 2.3 ton/ha
sugarcane, Y3, max = 73.0 kg/ha
coconut, Y4, max = 65 nuts/tree

f) Agricultural Productivity (2)

Agricultural productivity (2) is defined by the Study Team as follows:

$$\text{Agricultural Productivity (2)} = \text{Agricultural Productivity (1)} \times \frac{A1}{A1 + \alpha A2}$$

where : A1 = Farm area in hectares
A2 = Unutilized area in hectares
α = Accessibility to Metro Manila, Cebu City or Davao City

5) Road Development Indicators

a) Road Density Per Unit Area (Road Density (1))

$$\text{Road Density (1)} = \frac{L}{A'}, \frac{L}{Aar}, \frac{L'}{A}, \frac{L'}{Aar}, \frac{L''}{A} \text{ or } \frac{L''}{Aar}$$

where : L = Total physical road length in km
L' = Fair condition road length in km (assumed by the Study Team)

$$L' = \alpha \cdot l_{PCC} + \beta \cdot l_{AC} + \gamma \cdot l_{GR} + \delta \cdot l_{ET}$$

where : l_{PCC}, l_{AC}, l_{GR} and l_{ET} = Length of PCC, AC, gravel and earth roads, respectively

$\alpha, \beta, \gamma, \delta$ = Ratio of road length in acceptable condition for each surface type (assumed by the Study Team as $\alpha = 1.0$, $\beta = 0.6$, $\gamma = 0.15$ for barangay roads and 0.30 for other roads, and $\delta = 0$)

L'' = Road length paved with PCC and AC in km = $l_{PCC} + l_{AC}$
A = Total land area
Aar = Arable area

b) Road Density Per Unit Area and Population (Road Density (2))

$$\text{Road Density (2)} = \frac{L}{\sqrt{PA}}, \frac{L'}{\sqrt{PA}} \text{ or } \frac{L''}{\sqrt{PA}}$$

where : L, L' and L" = Same definition as a) above
P = Population in 1,000
A = Total land area in km^2

c) Road Density Per Unit Area, Population and Per Capita Income (Road Density (3))

$$\text{Road Density (3)} = \frac{L}{I\sqrt{PA}}, \frac{L'}{I\sqrt{PA}} \text{ or } \frac{L''}{I\sqrt{PA}}$$

where : L, L' and L" = Same definition as a) above
P = Population in 1000
A = Total land area
I = Per capita income in ₱/person

d) Fiar Condition Road Ratio

$$\text{Fair Condition Road Ratio} = \frac{L'}{L}$$

where : L and L' = Same definition as a) above

CHAPTER 3

ASSESSMENT OF REGIONAL/PROVINCIAL DEVELOPMENT POTENTIALITY

3.1 NATIONAL/REGIONAL SOCIO-ECONOMIC CHARACTERISTICS

3.1.1 Geography and Land Area

The Philippines, one of the largest islandgroups in the world, with 7,100 islands, lies between latitude 4^0 23'N and 21^0 25'N and between longitude 116^0 E and 127^0 E. The greatest north to south length is 1,850 kilometers, and the greatest east to west breadth is 1,110 kilometers. The archipelago is bounded on the west by the South China Sea, on the east by the Pacific Ocean, on the south by the Sulu and Celebes Seas, and on the north by the Bashi Channel.

The total land area of the Philippines is approximately 300,000 square kilometers, of which 51% (or 153,000 square kilometers) is covered by forest and 44% (or 133,000) square kilometers) is arable areas with slopes ranging from 0 to 18%.

3.1.2 Social Characteristics

In 1986, the total population was estimated at 56 million with a population density of 186.7 persons per square kilometer. The average population growth rate was estimated at 2.4% per annum. The rural population made up about 60% of total population. The total labor force was 21.5 million (38.4% of total population). The total number of workers was 18.96 million which was equivalent to 88% of the total labor force. The agricultural sector provided about one half (49.6%) of employment opportunities, followed by the service sector (35.9%) and the industrial sector (14.5%). The unemployment rate and the underemployment rate were quite high at 12% and 35%, respectively. Especially, the underemployment rate in rural areas was high, reaching 42%.

In 1985, the national average of family income was 2,560 pesos per month. The average family income in rural areas was only 1,784 pesos per month, which was even less than one half that in urban areas (3,850 pesos per month).

3.1.3 Economic Characteristics

1) Past Economic Performance

The Philippines enjoyed higher economic growth with an average of 6.4% per annum in the 1970s than in the 1960s which was 5.7% per annum. However, economic growth in the early 1980s was drastically decelerated due to the worldwide economic recession triggered by the second oil crisis in 1979. In 1984 and 1985, the Philippine economy had negative growth of 6.8% and 3.8%, respectively. Although the economic growth rate in 1986 turned positive at 1.0% per annum, the magnitude of economic scale remained at the level of 1979. Per capita GNP (in 1972 prices) was 1,618 pesos in 1985, which was as low as the level of 1975. Inflation rates in recent years were quite high. The average inflation rate from 1980 to 1983 was about 10% per annum; however, it went up to 50% in 1984 and 23% in 1985. Thus, the Philippines is suffering a serious economic crisis. As clearly established in the Medium Term Philippine Development Plan 1987-1992, economic recovery is the most urgent and important objective of the new administration.

2) Industrial Structure - National Level -

Table 3.1-1 shows the industrial structure in the Philippines for the years 1980 and 1985. The agriculture, industry and service sectors' shares of GDP in 1985 were 28.8%, 31.9% and 39.3%, respectively. To be noted was a sharp drop of the industry sector in GDP share as well as amount of output. The agriculture sector was the only sector recording positive growth during the 1980-85 period with an average rate of 1.9% per annum which was, however, far below the Government target. The service sector did not grow but maintained the level of 1980.

Although the agriculture sector's share of GDP was low at 28.8%, it employed about one half (1/2) of total workers. Therefore, the agriculture sector is regarded as the most important sector in the Philippines.

The labor productivity of all sectors decreased during the period 1980-85. The labor productivity of the agriculture sector was only 43% that of the industry and service sectors in 1985.

TABLE 3.1-1 INDUSTRIAL STRUCTURE - NATIONAL LEVEL -

Sector	GDP (Billion ₱ in 1972 Prices)		No. of Workers (1,000 Workers)		Labor Productivity (₱/Worker in 1972 Prices)	
	1980	1985	1980	1985	1980	1985
Agriculture Sector	23.73 (25.6%)	26.01 (28.8%)	8,458 (51.4%)	9,591 (48.4%)	2,806	2,712
Industry Sector	33.47 (36.1%)	28.88 (31.9%)	7,998 (48.6%)	10,226 (51.6%)	8,623	6,304
Service Sector	35.50 (38.3%)	35.58 (39.3%)				
TOTAL	92.70 (100%)	90.47 (100%)	16,456 (100%)	19,817 (100%)	5,633	4,565

Source: 1986 Philippine Statistical Yearbook

3) Industrial Structure - Regional Level -

Regional level economic data are presented in Table 3.1-2 and the industrial structure of each region is graphically shown in Figure 3.1-1.

About 30% of the nation's economic output was contributed by NCR alone, followed by Region IV (14.4%) and Region III (8.8%). The shares of Regions VIII and II of GDP were quite low at 2.4% and 2.7%, respectively.

The regions are classified into four (4) groups as shown in Table 3.1-3 and Figure 3.1-1.

TABLE 3.1-2 INDUSTRIAL STRUCTURE OF REGIONS: 1985

Sector	Philippines	NCR	Region I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
GRDP (Billion ₱ in 1972 Prices)														
Agriculture	26.01	-	1.69	1.39	2.51	4.03	1.72	2.93	1.53	1.23	2.08	1.79	2.94	2.15
Industry	28.88	13.84	0.74	0.28	2.64	4.50	0.29	1.85	1.85	0.22	0.17	0.93	0.93	0.64
Service	35.58	13.19	1.42	0.80	2.85	4.37	1.06	2.46	2.95	0.75	0.98	1.63	2.29	0.83
Total	90.47	27.03	3.85	2.47	8.00	12.90	3.07	7.24	6.33	2.20	3.23	4.35	6.16	3.62
(Share to Philippines)	(100%)	(29.9)	(4.2)	(2.7)	(8.8)	(14.40)	(3.3)	(8.0)	(7.0)	(2.4)	(3.6)	(4.8)	(6.8)	(4.0)
Share by Sector														
Agriculture	28.8	-	43.9	56.3	31.4	31.2	56.0	40.5	24.2	55.9	64.4	41.1	47.7	59.4
Industry	31.9	51.2	19.2	11.3	33.0	34.9	9.5	25.5	29.2	10.0	5.3	21.4	15.1	17.7
Service	39.3	48.8	36.9	32.4	35.6	33.9	34.5	34.0	46.6	34.1	30.3	37.5	37.2	22.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
No. of Workers (1,000)														
Agriculture	9,591	25	673	597	691	977	915	1,091	904	883	698	668	937	532
Industry/Service	10,226	2,095	623	385	1,103	1,526	622	809	784	400	259	590	624	406
Total	19,817	2,120	1,296	982	1,794	2,503	1,537	1,900	1,688	1,283	957	1,258	1,561	938
Share by Sector (%)														
Agriculture	48.4	1.2	52.4	61.5	38.9	39.3	60.0	57.9	54.0	69.4	73.7	53.7	60.5	57.5
Industry/Service	51.6	98.8	47.6	38.5	61.1	60.7	40.0	42.1	46.0	30.6	26.3	46.3	39.5	42.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Labor Productivity (₱/Worker)														
Agriculture	2,712	-	2,511	2,328	3,632	4,125	1,880	2,686	1,692	1,393	2,980	2,680	3,138	4,041
Industry/Service	6,304	12,902	3,467	3,805	4,977	5,812	2,170	5,328	6,122	2,425	4,440	4,440	5,160	3,620
Total	4,565	12,750	2,971	2,515	4,459	5,154	1,997	3,810	3,750	1,715	3,375	3,458	3,946	3,859

Source: 1986 Philippine Statistical Yearbook, NEDA

TABLE 3.1-3 CHARACTERISTICS OF REGIONS

Classification	Region	Characteristics
A: Predominantly agricultural regions	II, V, VIII, IX and XII	. Agriculture sector's share of GRDP is more than 50%. . Agriculture sector worker's ratio is about 60% or more. . Region's contribution to GDP is quite low, ranging from 2.7% to 4.0%.
B: Agricultural regions	I, VI, X and XI	. Agriculture sector's share of GRDP ranges from 40 to 50%. . Agriculture sector workers' ratio ranges from 50 to 60%. . Region's contribution to GDP ranges from 4 to 7%.
C: Regions with relatively high share of industry sector	III, IV and VII	. Three (3) sectors have almost even share of GRDP. Agriculture sector: 24 - 32% Industry sector : 29 - 35% Service sector : 34 - 47% . Region's contribution to GDP is relatively high, ranging from 7 to 14%.
D: Predominantly industry and service sector regions	N C R	. Industry sector's share of GRDP is high at 51% and the rest is shared by service sector. . Region's contribution to GDP is highest, reaching 30%. . Produces about one half (1/2) of nation's industry sector output.

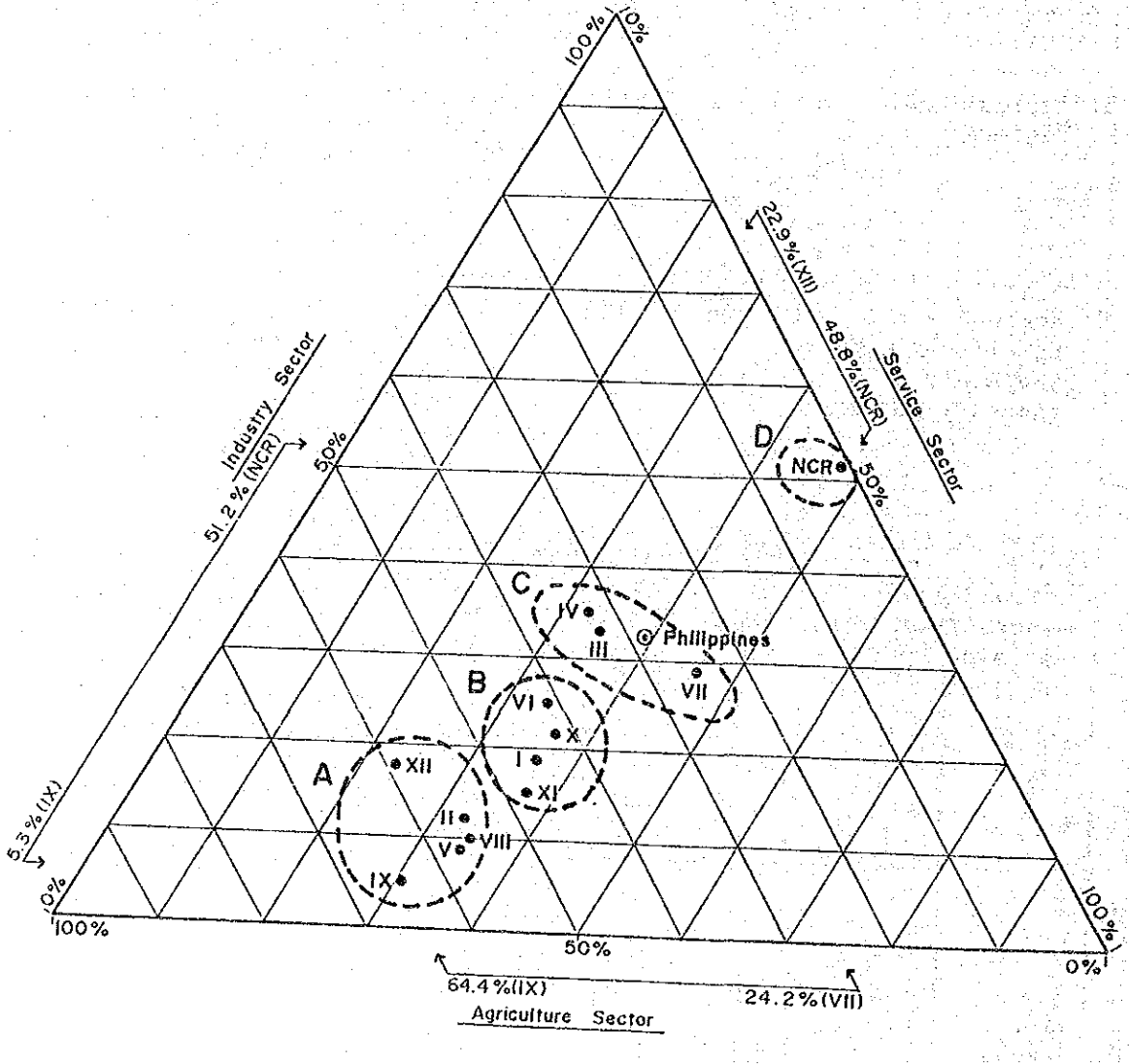


FIGURE 3.2-1 INDUSTRIAL STRUCTURE OF REGIONS

3.2 ASSESSMENT OF PROVINCIAL DEVELOPMENT POTENTIALITY

Figure 3.2-1 summarizes the interpretation of major indicators which are defined in Chapter 2.

In general, indicators were selected which would clearly indicate characteristics of the provinces in connection with traffic demand and need of road network development.

3.2.1 Physical and Demographic Indicators

1) Topographical Classification

The topography of a province is closely related to the pattern of road network development. Characteristics of road network pattern by type of topography will be discussed in Chapter 4.

2) Arable Area Ratio

This indicator is closely related to land utilization potential. A high arable area ratio means that a province has a relatively wide flat area which could be utilized not only for agricultural use but also for residential, industrial and commercial uses. On the other hand, a province with a lower arable area ratio has less potential in terms of land use, and most of the land may be limited to forest land use.

National average 44.4%
Higest arable area ratio .....80.8% (Sorsogon)
Lowest arable area ratio .....10.0% (Mountain Province)

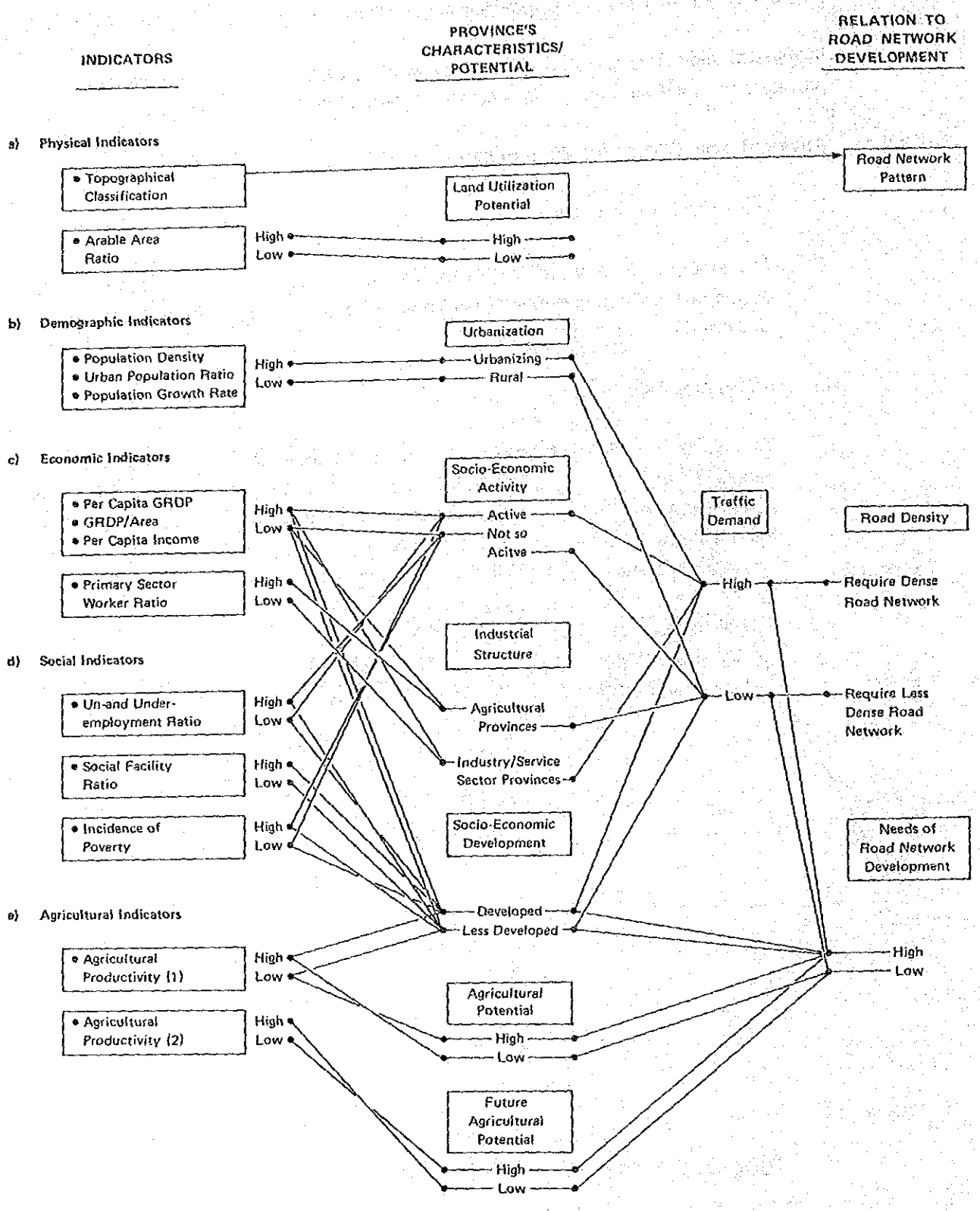


FIGURE 3.2-1 INDICATORS AND THEIR INTERPRETATION

3) Population Density and Arable Area Population Density

Population density has a close relation to urbanization and traffic demand. A province with a higher population density generally is more urbanized and has higher traffic demands which result in requiring a higher road density.

Unit: Persons per Km^2

	Population Density	Arable Area Population Density
National Average	182	410
Highest	725 (Cavite)	1,297 (Cavite)
Lowest	29 (Palawan)	79 (Aurora)

4) Urban Population Ratio (See Figure 3.2-2)

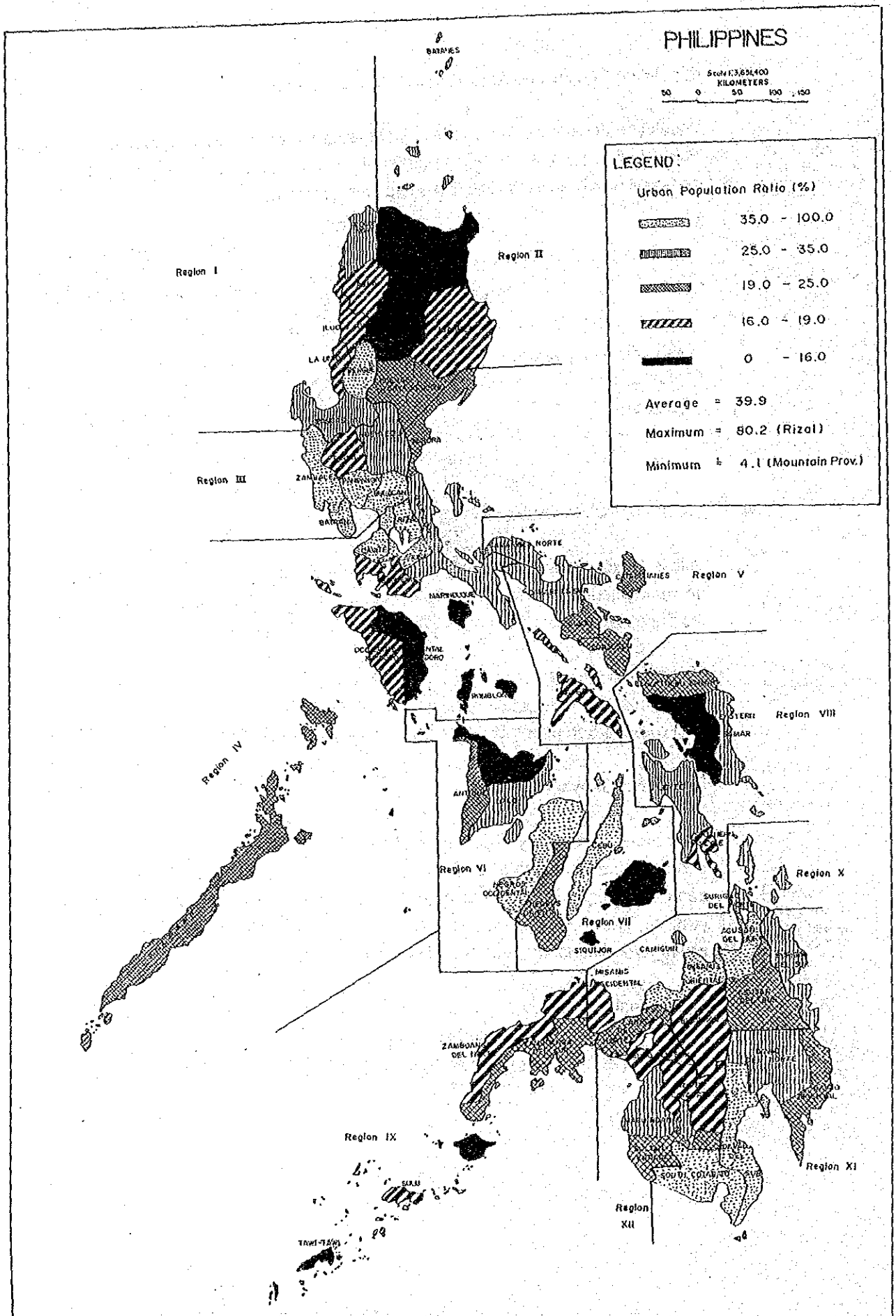
This indicator shows exactly the degree of urbanization of a province. Provinces with an urban population ratio or more than 50% are all located near Metro Manila. These are the provinces of Rizal, Laguna, Cavite, Zambales, Pampanga and Bulacan.

National average 39.9%
Highest urban population ratio .....80.2% (Rizal)
Lowest urban population ratio .....4.1% (Mountain Province)

5) Population Growth Rate

As a general tendency, urban areas have a higher population growth rate, because people migrate to urban areas to find jobs. However, there are several provinces which cannot be explained by that reason. These provinces are Sulu (5.37%), Quirino (4.32%), Tawi-Tawi (4.27%), Agusan Del Sur (3.83%) and Aurora (3.58%), all of which are regarded as among the most depressed provinces.

National average 2.65%
Highest population growth rate .....5.37% (Sulu)
Lowest population growth rate .....1.14% (Lanao del Sur)



PILOT STUDY FOR THE RURAL ROAD NETWORK DEVELOPMENT PROJECT	Figure 3.2-2 URBAN POPULATION RATIO (%)

3.2.2 Economic Indicators

1) Per Capita GRDP (See Figure 3.2-3) and Land Productivity

Both indicators are closely related to economic activity, industrial structure and degree of economic development. If indicators of a province show a high value, it can be interpreted that the province is economically active and advanced and, in most cases, its industrial structure is relatively dominated by the industry and service sectors. Such a province has a high traffic demand and, therefore, requires a dense road network.

	Per Capita GRDP (₱/person)	Land Productivity (1000 ₱/km^2)
National Average	11,159	2,034
Highest	15,955 (Rizal)	11,131 (Cavite)
Lowest	3,788 (Northern Samar)	201 (Kalinga-Apayao)

As shown above, provincial disparity in economic conditions is quite large. In terms of per capita GRDP, Northern Samar is only one fourth (1/4) that of Rizal.

2) Per Capita Income (See Figure 3.2-4)

The same interpretation as 1) above can be applied to this indicator; however, this is more related to people's standard of living.

National average .....5,593 ₱/Year
Highest per capita income .....10,983 ₱/Year (Zambales)
Lowest per capita income .....2,373 ₱/Year (Northern Samar)

Provincial disparity is also quite large. The per capita income of Northern Samar is only one fifth (1/5) that of Zambales.

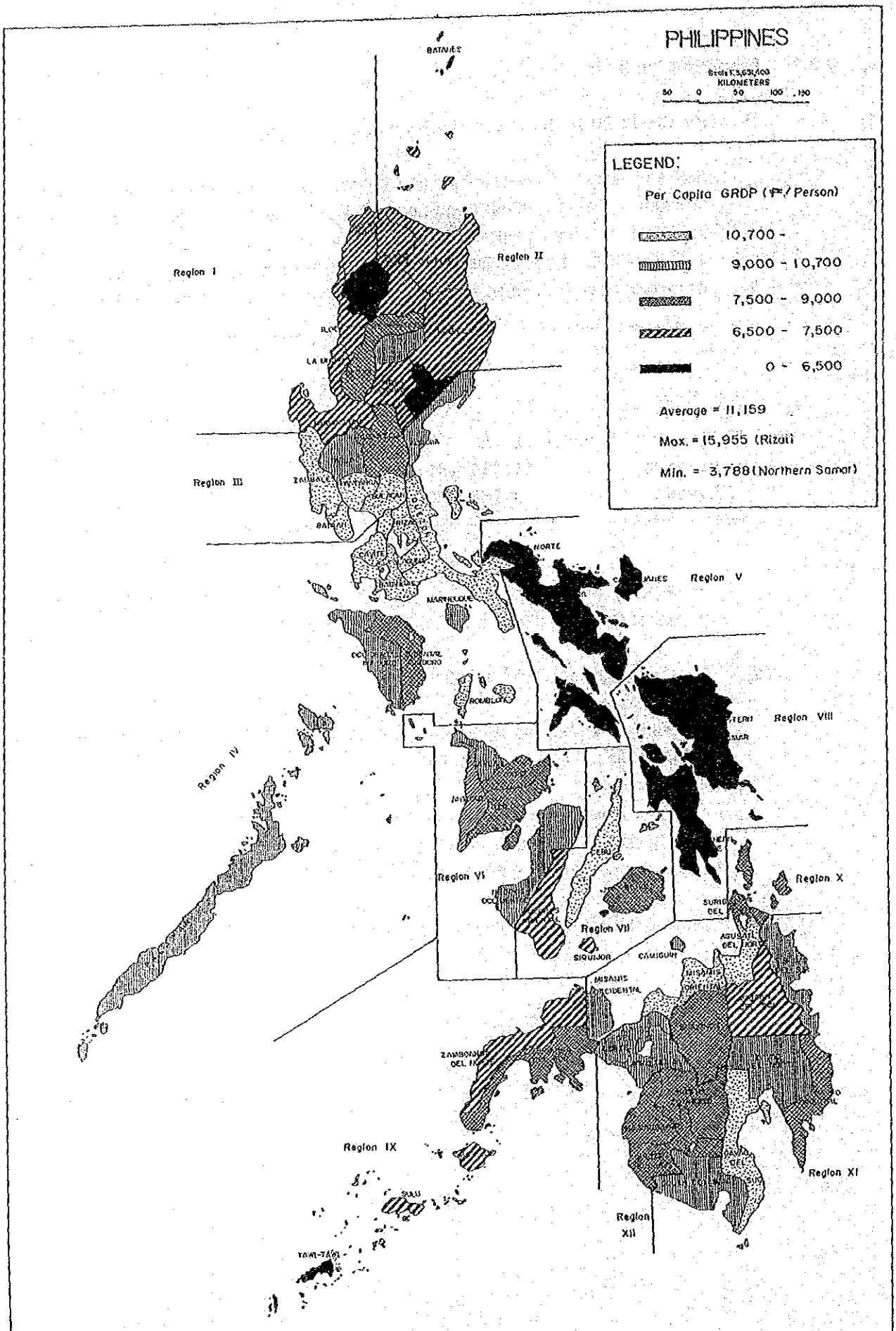


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Figure 3.2-3
PER CAPITA GRDP (₱/ Person)

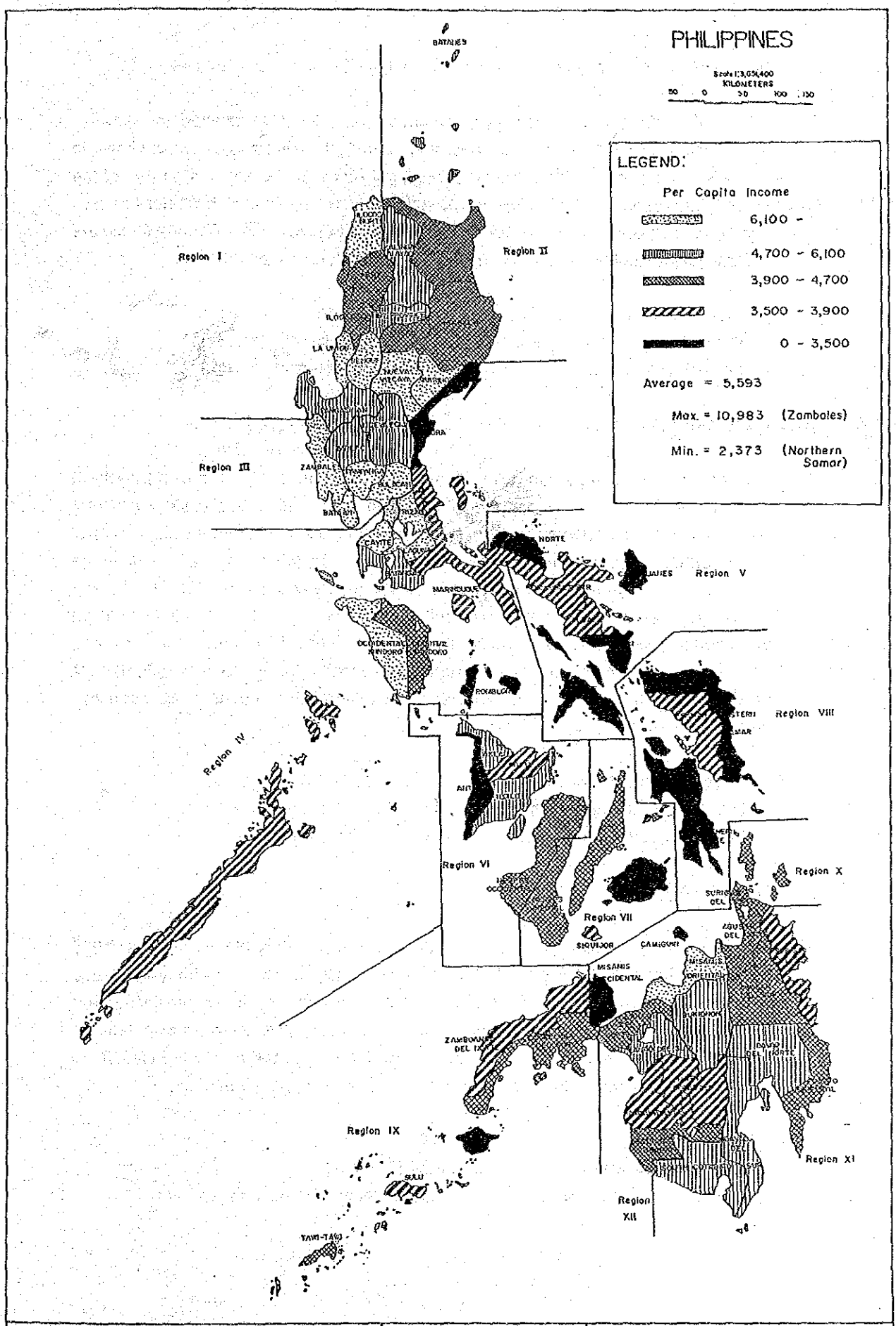

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Figure 3.2-4

PER CAPITA INCOME