REPORT

ON

INDUSTRIAL ESTATE PROJECT

IN

THE REPUBLIC OF THE PHILIPPINES

MARCH 1964

OVERSEAS TECHNICAL COOPERATION AGENCY OF JAPAN

ERRATA

Page	Line	Errors as appeared in the report	Correction
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7	5th from bottom	yeats	years
12	Middle of page	...industrial level using..	..industrial level by using..
14	7th from bottom	ModelII	Model II
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PREFACE

The Government of Japan, in response to a request from the Philippine Government, entrusted to the Overseas Technical Cooperation Agency (OTCA) the task of conducting a preliminary survey in the Philippines to help the implementation of the Industrial Estate Development Program which forms a part of the Five Year Socio-Economic Program of the Philippines. The OTCA fully realizing the importance of the Industrial Estate Program to the industrialization of the Philippines, organized a five-member team of industrial estate experts and dispatched it to the Philippines on February 13, 1964 for a three-week on-the-spot survey under the leadership of Dr. M. Suzuki, Chairman of Japan Port & Harbor Association.

The OTCA which was established on July 1, 1962, serves as an executing agency of the Japanese Government to conduct Japan's government-level technical cooperation to Asia, Near & Middle East, Africa and Latin America. Its principal activities are acceptance of overseas trainees, assignment of technical experts, establishment of overseas technical cooperation centers and conduction of preliminary surveys for development projects.

It is my sincere hope that this report will prove to be useful in the field of technical implementation of the Industrial Estate Development Program and will also help to foster closer technical ties and better understanding between the Philippines and Japan.

Lastly, on behalf of the OTCA, I wish to take this opportunity to express our greatest appreciation and sincere thanks to the various agencies of the Philippine Government for their precious help and cooperation given to the Survey Team without which it would not have been possible for the Team to conduct smoothly the survey on the spot.

March, 1964

Shinichi Shibusawa

Director General
Overseas Technical Cooperation Agency

Introductory

Appendices

Introductory

This report, the result of an investigation by the Industrial Estate Survey Team, is mainly a field survey of possible industrial estates for the Republic of the Philippines, conducted in pre-selected sites by the Program Implementation Agency (hereinafter referred to as PIA), of the Republic of the Philippines in various regions of the country. It is for the most part a factual statment supported by tabulated information both in the body of the report and in the Appendices.

The Industrial Estate Survey Team headed by Dr. Suzuki with four other members was organized and dispatched to the Philippines by the Overseas Technical Cooperation Agency (hereinafter referred to as OTCA), of the Japanese Government. The Team left for the Philippines on February 13, 1964 and upon completion of its three weeks of field survey, returned to Tokyo on March 5, 1964.

The Team has been aware that in order to fulfill the Five Year Socio-Economic Program of the country, a policy for nation-wide industrialization is of utmost importance, and with the rich, abundant natural resources at the disposal of the Philippines, it would not be too difficult to realize this program if a basic policy for industrialization is drawn and implementation of the projects be carried out step by step properly and effectively.

It is regrettable that owing to the lack of time and also in order to meet the means within the framework of the government's industrial plan for the Five Year Socio-Economic Program, the survey could only be conducted in the pre-selected sites by PIA, viz, at Limay, Rosario, Davao and Iligan. Before leaving for the field survey, members of the Team were

briefed on the Government's Five Year Socio-Economic Program and also paper-discussions on the PIA survey-study were being held.

The four prospective industrial sites have different roles to play in the realization of the industrial program. It is found that Limay lacks certain qualities for being a center of industrialization while Rosario promises more potentiality as one of the important industrialized centers in time to come. However, concrete proposal and recommendation will not be practical without further regional investigation and survey of the areas.

We wish to express our deepest appreciation of the help which we have received from the PIA of the Philippine Government. We are particularly grateful to Mr. Armand V. Fabella, Director General of PIA who was largely responsible for the dispatch of this Team, and also to Mr. Carlos Tan Jr., Diector of PIA's Industrial Project Development and Evaluation Division, and seven other staffs of PIA who kindly guided us during our surveys.

Part I

The Industrial Estate Survey Team.

1. Why and how the Industrial Estate Survey Team was organized and dispatched to the Philippines.

How was the Industrial Estate Survey Team constituted and for what purpose was it sent to the Philippines by the Japanese Government? To answer these questions, one has to understand the policy objectives of the Japanese Government especially in South East Asia under the present administration of Prime Minister Hayato Ikeda. Policy of promoting closer economic collaboration between Japan and its Asian neighbours has repeatedly been comitted by the Japanese Government. Thus, a technical survey team is dispatched first as a way of determining the precise nature of cooperation that the Japanese Government may be able to extend to any country.

The magnitude and general pattern of such assistance, whether technical, financial, or both, is what a survey team for. Its constitution and dispatch is for the purpose of merely acquainting itself of the facts as they exist in the requesting country, preparatory to formalizing any assistance policy on an official level.

On 24th August, 1962, the PIA of the Philippine Government was established under the directorship of Mr. Sixto K. Roxas (Under the direction of Mr. Armand V. Fabella since June 1963), by the Executive Order No. 17 of the President of the Philippines to assist the various governmental agencies in their effective implementation of the Five Year Socio-Economic Program presented to the Congress by the President on 22nd January, 1962, in which industrialization of the country is being emphasized.

Immediately after its establishment, the PIA actively functioned its assinments and in November 1963, sent one of its industrial consultants, Mr. Mariano Leonard C. Jr., to Japan to study the industrial estate development program of Japan. Upon Mr. Mariano's return to the Philippines, an invitation from PIA for the dispatch of an industrial estate survey team was extended to the Japanese Government on 27th December, 1963.

It was on the basis of the foregoing consideration that the OTCA upon receipt of a request from the PIA of the Republic of the Philippines initiated the forming of a Technical Survey Team. And also OTCA regarded it as an honor and opportunity for the fulfilment of the Macapagal-Ikeda Agreement which called for technical and economic cooperation between our two countries during Prime Minister Ideda's state visit to the Philippines in September 1963. Thus the Industrial Estate Survey Team was dispatched to the Philippines with a view of utilizing the technical know-how and experience of Japan in the field of industrial estate development, to help driving forward the industrialization program of the Philippines which possesses great feasibility and potentiality of developing into a highly industrialized country in South-East Asia.

2. Formation of the Industrial Estate Survey Team.

The Team, headed by Dr. M. Suzuki, consisted of the following members:

1. Dr. Masatsugu Suzuki	Chairman, Industrial Location Deliberation Council. Chairman, Japan Port & Harbor Association Board Member, Japan Engineering Consultants Co.
2. Mr. Hiroshi Hagiwara	Industrial Estate Supervisor of Ministry of International Trade and Industry, Japan.

3.	Mr. Isao Orishimo	Chief of Research-work Section of Japan Industrial Estate Institute.
4.	Mr. Tokio Honma	Deputy-Director of Planning Dept. of JEC
5.	Mr. Kazuaki Suma	Director of International Dept. of JEC

3. Dispatch of the Team.

The Industrial Estate Survey Team under the joint auspices of the PIA and OTCA of the Philippine and Japanese governments respectively, was dispatched to the Philippines from February 13, to March 3, 1964 for a three-week field survey of the four pre-selected proposed industrial sites throughout the country. The four pre-selected sites are Limay, Rosario, Iligan and Davao.

Part II

Purpose of the Survey and its Basic Direction.

1. Purpose of the Survey

(i) Proposals for an overall development plan for the provision of infrastructural facilities on the four pre-selected proposed industrial estates throughout the country. (viz. Limay, Rosario, Iligan and Davao).

(ii) The drawing-up of a preliminary master plan for the Pilot Industrial Development Site which shall include among other things, the feasibility plans for harbor, transportation, power facilities, industrial water and other necessary facilities.

II. Basic Direction of the Survey for the Establishment of Industrial Estates.

In order to decide the basic policy and direction for the industrial estate program, the following should be taken into consideration:

(i) Geographical features of the Philippines.

The total area of the Philippines is roughly the size of Honshu (main land of Japan) and Hokkaido combined, as an island nation consisting of more than seven thousand large and small islands the Philippines possesses long stretches of natural coastal lines and seaways which are very similar to those of Japan.

The average temperature of the Philippines is 27.0°C, and in its capital city of Manila, the minimum temperatue in January is 21.0°C. There is very little change of temperature throughout the year; and, of course, the chilliness of the winter months of Japan is incomprehensible to the inhabitants of the islands.

The natural coastal lines and seaways together with the many

existing canals throughout the country and also its hot climate, provide the best conditions and means for the development of her industrial sites along the sea coasts and canals. A look at the development of the industrial estates of those advanced countries of the world will justify the important role played by these seaways in the progress of industrial revolution.

(ii) Industrial estate development in the West.

In West Germany, most of her heavy and chemical industries were being developed along the River Rhein which served as the main center for the industrial activities of the country.

In the Soviet Union, the great seaway network formed by connecting the five seas with canals and rivers, is practically inactivated by the cold temperature freezing the canals and rivers in the winter months; i.e. from the end of November to March or April. And the seaway which connects the five lakes of North America to River St. Lawrence, is found to be frozen also during the winter months.

In the case of Japan, which shares the same geographical features with the Philippine islands, the long stretches of natural coastal lines take the place of canals and are playing a very important part in her industrial achievements. And in addition, these natural seaways can be used through out the year.

The advantages of developing the industrial estates along the sea coasts do not limit only to the natural geographical factors but also in the following facts:

About forty to fifty yeats ago, the iron ore consumed in the Rhein areas was imported mostly from the Scandinavian Peninsula by means of freighters of about ten thousand tons which carried the ore to Port Emden and from there the ore was again loaded into small boats and transported to the factories through Dortmund

Ems Canal. Altogether, it took ten days for the raw material to reach the factories. But, recently, owing to the development of EEC, it no longer necessarily depends on one's country's own port, Rotterdam of the Netherlands is being used and through the branch river of Rhein, the time for transporting the raw materials has shortened to seven days. However, the transportion cost has not diminished, because the raw materials are still being transferred to smaller boats before being delivered to the factories, thus two handlings of cargo are still required.

In Japan, the iron ore is being imported from far away countries by freighters and they carry the raw material directly to the pier where it is delivered directly to factories established along the coasts. In this case, only one handling of cargo is necessary and a lot of time is saved besides the cost of transportation being greatly diminished.

By diminishing the transportation cost, which accounts for more than forty percent in the total cost in steel production and close to thirty percent in oil refinery, to its minimum, Japanese coastal industries are in a far better position than those of any other advanced country in the world. With the theoretical and technical knowledge of coastal industrial estate at her disposal, Japan is able to develop her industries so rapidly and successfully which cannot be competed by any other country as can be witnessed from the achievements of the past and present. It is not exaggerate to say that the development of coastal industrial estate is a Japanese technical speciality.

Thus, the basic policy and direction for the development of industrial estates in the Philippines which is blessed with best natural seaways and climate can be directed at establishing the sites along the sea coasts and canals by utilizing the experience and technical know-how of Japan in this respect to realize the industrialization program for the country within the shortest possible period of time and with the minimum of cost.

Part III

Economic Growth and Change of Regional Structure In the Philippines

A. Rate of industrial growth and regional economic structure.

Progress of industrialization in the economic structure of the Philippines can be noted through the change of structures in labor force and income, as follows:
For a period of ten years from 1948, the employment in manufacturing industry rose from 450,000 to 1,140,000 showing an increase in labor force of about 2.52 times: also, the income has risen from 656 milion pesos to 1,853 million pesos, an increase of about 1.82 times. If compared with other industries, this rate of increase in the manufacturing industry is considered to be quite high.

*Change in the structure of labor force

(unit: 1,000 men)

	1948		1958	
Agriculture-Forestry-Fishery	4,875	65.7(%)	5,549	57.4(%)
Manufacturing Industry	453	6.1	1,143	11.8
Total	7,416		9,654	

*From International Labor Office Yearbook of Labor Statistics Geneva 1959

*Change in structure of national income

(unit: 1 million pesos)

	1948		1960	
Agriculture	2,376	41(%)	3,539	33(%)
Mining Ind.	21	0.4	181	1.7
Manufacturing Ind.	656	11	1,853	17
Construction	307	5	316	3
Trade	716	12	1,248	11
Transp. & Commun.	195	3	384	3
Services	1,442	25	2,972	28
National Income	5,713		10,492	

*Urbano A. Zafra: Philippine Economic Handbook, 1960

*Comparison of production index in different industries

	Agriculture	Mining	Industry
1949	59	47	46
1950	64	61	56
1951	73	76	66
1952	79	93	69
1953	85	98	79
1954	94	92	88
1955	100	100	100
1956	106	110	115
1957	110	123	125
1958	110	122	134
1959	117	132	145
1960	120	126	

*Central Bank Twelfth Annual Report

Graph 1, showing the change of income and labor force and Tables 1 and 2 show the output increase in manufacturing industries.

From the production index of manufactured goods, it is found that textiles, rubber goods, leather goods, concrete products and metal products showed the most rapid growth.

If an estimate of production level based on the statistics of the Central Bank from 1949 to 1959 is calculated up to 1967, an increase of six percent per year which is equivalent to the rate of increase in GNP of the Five Year Program will be obtained. Based on the index thus obtained, and using the industrial output of 2,970 million pesos in 1959, the industrial production level is anticipated as follows:

Year	Production index	Output (mil. peso)	Annual increase (mil. peso)
1958	145	2,970	
1960	154	3,140	+170
1961	164	3,340	+200
1962	174	3,540	+200
1963	184	3,740	+200
1964	194	3,950	+210
1965	204	4,160	+210
1966	214	4,380	+220
1967	224	4,570	+190

*The above figures are shown in Graph 2, in the Appendices.

The following table shows the output per square meter of industrial land and scale of employment in Japan.

Land

Year	Yen/m^2 of industrial land
1958	17,200
1961	26,500

Employment

Year	Number of men/1 million pesos (100 million yen)
1958	49.2 men
1961	36.7 men

Assuming present Philippine industrial level using fifteen thousand yen and fifty men as the basis to compute the following table.

Year	output	site	employee
1962	3,540	23,600 $1000m^2$	178,000 men
1963	3,740	25,000	187,000
1964	3,950	26,300	197,000
1965	4,160	27,700	208,000
1966	4,380	29,200	218,000
1067	4,570	30,400	228,000

A rough calculation based on industrial production level reveals that an increase of 6,800,000 square meters of industrial land and 50,000 men in employment will be needed in a period of Five years from 1962.

Based on the above calculations, if 1,300,000 square meters (130 hectares) of land are required a year, then, in five to ten years time, 680 to 1,360 hectares of land will be needed. If seventy percent of the needed land can be developed around Manila for

the manufacture of consuming comodities to replace imported consumer goods and save the foreign currency reserves which seemed to be more practical and imperative, then, the remaining thirty percent of land can be developed in other regions of the country. To decide in what way this need of industrial land will be solved, a careful study of tendency in investment by industries is of great necessity. Also, in order to determine the future change of economic structure, information and data analysis regarding estimated productions and deliveries of various industries and direction of investment are required. A better estimation and recommendation of appropriate types of industries for the established estates will be compiled, as soon as all the necessary data are available.

The present available data are being attached as Tables 3, 4, 5 and 6 in the Appendices for references.

Part IV

Comparison of Conditions in the Four Pre-selected Sites

In comparing the conditions in the selected sites, it has to be mentioned that difference in the objectives for establishment of the industrial sites provides different dimensions of conditons for comparison, thus, if industries to be established are different both in nature and magnitude, then the dimensions for comparison are different and comparison cannot be possibly made.

For example, if the purposes for establishing the sites are
(1) acquisition of the effectivity of investment in basic industries,
(2) rationalization of concentration of small enterprises,
(3) readjustment of city planning around Manila,
then, the above three examples cannot be compared as they possess different dimensions for compariosn.

1. Development of basic industries.
To compare existing conditons for the establishment of basic industries such as petroleum refinery, petroleum chemical and iron smelting, the availability of low cost raw materials, cheap transportation to the markets and the interrelationship between the two are usually compared. Generally, by using Liner Programing, the above conditions can be theoretically understood.
Two examples of L. P. Model are explained as follows:

Model I is to make up a plan for available allocation of industries and to establish a proper measure for public investment, for instance, in reads and harbors.

ModelII, which has simultaneous equations system, is for the local governments to analyze the local economic structure and establish their available economic policies.

At the same time, by Molel II, it is possible to forecast the change in the structure of local economy and to estimate the effects that the local industrial developments bring to regional income, labor, finance. and so on.

Models of Locational Assignment

Object : Optimal Location of Industries through minimization of production and transportation costs subject to the restrictions (1) regional final demands must be met, (2) locational factors are limited.

MODEL 1 :

(1) Assumptions

1 : Stability of input-output rations in region.

2 : Divisibility of production plants.

3: Non-existence of Economy of Scale.

4 : Non transferability of locational factors. (land, water etc.)

(2) Notations

A^k - a_{ij}^k ---- n x n matrix,

a_{ij}^k ---- input-output coefficient, the amount of i-th input required to produce one unit of j-th output in k-th region.

B^k - b_{ij}^k ---- n x 1 matrix,

b_{ij}^k ---- input coefficient of i-th locational factor required to produce one unit of j-th output in k-th region.

E ---------- export matrix (n x n)

$$\begin{cases} e_i^{ks} = -1 & \text{---- } i = j \\ \quad = 0 & \text{---- } i = j \end{cases}$$

(negative unit matrix)

I ---------- import matrix (n x n), (unit matrix)

X^k ---------- n x 1 vector,

X_i^k ----- output of i-th goods k-th region.

Y^{ks} ---------- n x 1 vector,

y_i^{ks} ----- the amount of i-th goods transported from k-th to S-th region

$Z^k = \{z_i^k\}$ ----- n x 1 vector,

z_i^k ----- final demand of i-th goods in k-th region,

$R^k = \{r_i^k\}$ ----- n x 1 vector,

r_i^k ------ capacity of i-th locational factor in k-th region,

$c^{k'}$ ---------- 1 x n vector, production cost coefficients for X^k,

$t^{k'}$ ---------- 1 x n vector, transportation cost coefficients for Y^k,

n ---------- number of industries,

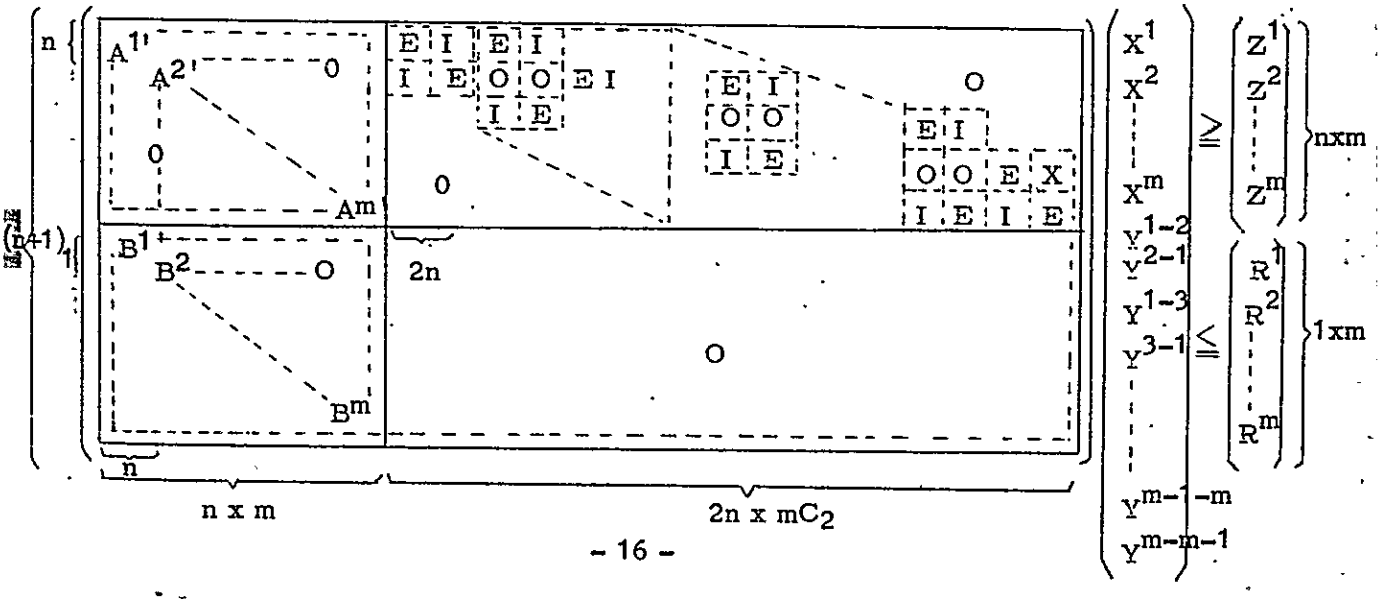
m ---------- number of regions,

1 ---------- number of limited-locational factors,

(3) Objective Function and Ristrictions

$$\text{minimize: } f = \left\{ \sum_k c^{k'} X^k + \sum_{kL} \sum t^{kL'} Y^{kL} \right\}$$

$$\text{subject to: } X^k \geq 0 \quad Y^{kL} \geq 0 \quad (K, L = 1 \text{ ---- } Lm,)$$



It is difficult to solve this model in the point of data-collection (especially average production cost in a region) and computation. Moreover it may lead us to a trivial solution because of the exclusion of indivisibility of industrial plants.

MODEL 2:

(1) Assumptions

1: Only main industries come into the model. (e.g. iron-steel, petroleum, petro-chemical, electricity, etc.)

2: All pieces of land in a region which are available for location of main industries are specified. We call them "points" which lie in regions.

3: Every piece of land is good for location of one or several indistries.

4: Regional final demands of goods are estimated (both direct and indirect demand effects from industrial location itself are included.)

5: Produced goods are all transportable.

(2) Notations

$A_i^{h'} = a_{i1}^h, a_{i2}^h, \cdots, a_{ih}^h$ production coefficient vector. $(1 \times k)$,

a_{ij}^h ----- production coefficient of i-th goods at j-th point in h-th region.

E & I ----- export import matrix (n x n), same as in MODEL 1. (n x n)

$X_i^h = X_{i1}^h, X_{i2}^h, \cdots, X_{ik}^h$ ' production activity vector $(k \times 1)$, x_{ij}^h ---- 1 or 0.

$Y^{ks} = y_1^{ks}, y_2^{ks}, \cdots y_n^{ks}$ ' transportation activity vector (n x 1)

y_i^{ks} ----- the amount of i-th good transported k-th to S-th region.

$Z^h = \{z_1^h, z_2^h, \cdots, z_n^h\}'$ regional final demand vector (n x 1),

z_i^h ---------- regional final demand of i-th good in k-th region

$C_i^{h'} = \{c_{i1}^h, c_{i2}^h, \cdots, c_{ik}^h\}$ the vector of total cost of production (1 x k),

$T^{ks'} = \{t_1^{ks}, t_2^{ks}, \cdots t_n^{ks}\}$ transportation cost coefficient vector (1 x n).

(3) Target Function and Restrictions

Objective

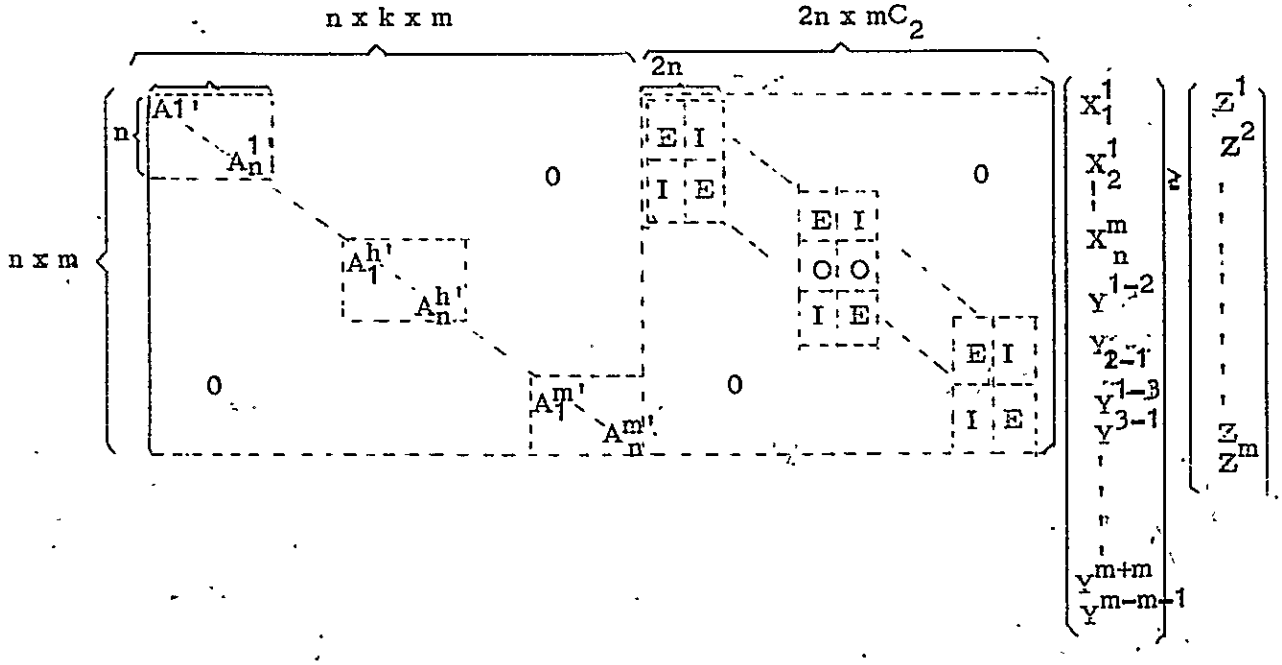
$$\text{minimize : } f = \left\{ \sum_{hi} \sum c_i^{h'} X_i^h + \sum_{ks} \sum T^{ks'} Y^{ks} \right\}$$

$$\text{subject to : } X_i^k \geqq 0,\ Y^{ks} \geqq 0 \quad \begin{matrix}(hi=1,2, \cdots, n. \\ k,s\ 1,2 \cdots, m.)\end{matrix}$$

k -- number of points in a region,

n -- number of industries,

m -- number of regions,



If every point can be used for only one specific industry, we must add the conditions,

$$x_{i1}^{h} - x_{j1}^{h} = 0 \ (i \neq j \text{ for all h and 1})$$

This model is better for available data and computation, but economic implication of final demand must be different from the ordinary definition.

2. Prevention of overcrowding in big cities and rationalization of big and small enterprises.

If the main objective for establishing the industrial sites is to prevent the overcrowding of big cities, then, areas surrounding Manila may be considered suitable. Several industrial sitess established in area of about one hundred kilometers from the business center of Manila can be easily envisaged. However, from what the Team has observed, Rosario can be well developed into a suitable substitute industrial site to fulfill this decentralization objective.

Part V

Distribution of Scale of Industries in Regions to be Developed.

The recent industrial estate survey in the Philippines would not be dealing merely with the technical aspects of the establishment of industrial estates if its establishment was to be used as a means to help materialize the Five Year Socio-Economic Program of the country. To discuss the effect of industrial estate establishment in the development of the country, locations and scales of the industrial sites should be carefully studied, and plans for the implementation of the establishment of the estates and its balance in the economic effect should also be examined.

Objectives for the establishment of industrial sites in the Philippines can be summed up as follows:

1. A means to accelerate the country's industrialization program.
2. Adjustment for and agreement with the aims of the Five Year Socio-Economic Program which includes plan for establishment of industrial estates.
3. Consonance with the industrial dispersal program.
4. Counterplan for small enterprises.

When examining the connection between the industrial site establishment program and the Five Year Program, it is found that no regional economic plan has been launched regionally under the Five Year Program, although there are Mindanao Development Program, Ten Year Electric Power Program, National Road and Railroad Development Program etc. Because of this, no specific connection exists among the above programs.

Thus, the plan for the establishment of industrial sites requires a certain estimate of regional demand for industrial land, and depending on this estimate of demand can only the scales and locations

of the industrial sites to be established, be planned and worked out. The industrial sites thus established, no matter in whose hand the management falls, are no different from other commodities, they need to be introduced to the public and later they will sold to those who need them.

As premises for the decision of the scales in the industrial site establishment, the following are cited:

1. Existence of interrelationship with the various governmental economic programs.
2. Establishment of regional economic plan for the purpose of raising the efficiency of the capital invested in the establishment of industrial sites and advancing the industrialization of the country.
3. Information regarding progress of industrialization in the country.

Regional macro-analysis including estimations of regional investment functional formula, regional market structure, mobility of labor force, etc., and micro-analysis such as questionnaire survey of enterprises or industrialists and hearings from state and city government are two ways of finding out the answer for the scale of the industrial sites.

It is recommended that PIA should carry out the collection of the necessary data accordingly because they are required in micro-analysis as well as in micro-analysis for recognition of the tendency in investment by industries for the industrial sites.

Part VI

Comparions of Four Sites by Looking at their Geographical Conditions of Location.

The survey team could not possibly fully formulate a detailed planning toward the present and future industrialization program of the Philippines in each of the four sites proposed by PIA because of its short stay in the Philippines and no sufficient materials available at the time of survey. It is therefore, necessary to focus attention to consider on the possiblities of industrial development for the four sites by merits of their geographical conditions of location.

1. Main features of location comparison.

The following points are noted by comparing industrial structures of the Philippines and Japan as shown in Table 7 and 8.

a) The Philippines can take pride in its oil refinery industry already in its exceptionally high productive level.

b) Basic metal industries like steel mill and non-ferrous metal smelting plants are extremely few in the Philippines.

c) The composition of processing industry such as machineries requires technical assistance to activate it from its present reluctant position.

d) Natural resource type processing industries such as foodstuff and lumber products are already in the advanced stage.

e). Consumers' goods processing industries such as textile industry whose materials are not available in the Philippines are still standing on the primary stage.

While it is necessary to make further research into the direction to which the Philippine development will point to, the line is already drawn by considering the points stated above that the processing industry needs all the assistance and upbringing

to move it forward from its present position.

The present Philippine industry is concentrated largely in certain particular areas because of their immediate advantages such as availability of natural resources, cheap power supply, and ideal harbor which requires minimum investment for its port facility. These conditions do contribute improvement for immediate usage but on the other hand they do not help to advance them further from its present position. This can be ascertained by its total volume of rales which was three billion pesos in 1959.

It can be well understood that Limay and Iligan, for instance, have been developed basing primarily on their geographical advantages such as ideal seaboard, low-cost power supply and sufficient natural resources. It is a general idea that these natural conditons can be the major factors to spur the establishment of one or several particular types of industries. On the contrary, economic and social environments sometimes may even hinder them from further developing into large scale industrial estates. There have been numerous cases in Japan where the expansion tempo of industrial regions primarily established by their immediate advantages are hampered and slowed down substantially. The reasons are listed below:

a) Natural resources utilization industry will limit its scale within those industries directly ralated to the resources available. This will hinder accumulation of industries which are to be followed by a line of industries directly and indirectly related to them.
b) In case where hydro-electric power supply is cheap, there is a possibility that the cost of electicity may rise in accordance with economic development and create decrease of location value which may restrict accumulation of industries in the region.
c) It has been found that prospective area such as Limay is sometimes impeded by unfavorable geographical condition

in the rear although the cost of construction for harbor facility does not require major capital investment.

d) Incases where industries based upon their natural geographical condition are located in quite save distance from consuming market, cost in transportation, quality and quantity supply of labor may restrict development of processing industries which involve advanced technical aspects.

Thus, to select a site for large scale industrial complex greatly depends on its possibility and potentiality for establishing processing industries and the development of such industries may be achieved in such areas furnished by the following factors:

a) The progress of processing industries hinges on a consuming market with many consumption classes. A city of big population and relatively high income is the key that will absorb processed goods.

b) A processing industrial area requires both quality and quantity labor, therefore, an area with a high potential supply of labor is most desirable.

c) The time from its infant stage to maturity of an industrial area needs close collaboration of experimental and research institutes for their knowlege and facilities; this is especially true in the processing industry which must have intimate contact with experimental stations and academic institutions to provide it with market tendency and survey reports.

d) The industrial area must also be a trading port to handle export and import trade. It is predicted that certain basic materials and specified machine parts may not be available domestically and they need to be imported.

e) The industrial area must have a complete communication network both in its transport and telecommunication facilities, and such location is usually found in a big city or in its vicinity.

The above factors are considered to play an important role in facilitating development of processing industry in general rather than help bringing the cost down.

The Survey Team recognizes the importance of expansion of resource type industries already existing, however, judging from the fact that the present processing industry of the Philippines is still on its infant stage and success or failure of the Philippine industry greatly depends on early development of processing industry, more emphasis is being put on factors in determining priority among four proposed sites such as the necessity of sites fully potential to establish processing industry and possibility of establishing connection with basic industries which will become inevitable in accordance with accumulation of various types of processing industries.

Limay

In Limay, ESSO has established an oil refinery plant, and a fertilizer plant is also under construction. According to the PIA data, a government site with an area of 600 hectares is available for its industrialization program. The available site with its solid soil foundation, however, has certain unfavorable geographical conditions which may hinder future plan for development of large scale industrial site. The reasons are cited as follows:

1. Reclamation of industrial site by levelling the hills will cost much more than sea-side industrial site reclaimed by dredgers.
2. Even if sea-side reclamation is carried out in Limay, it will also cost far more than that of other region owing to the submerged solid stratum of the area.
3. Lack of labor force resulting from few notable municipalities in the neighbouring areas. If labor force were to be supplied from Manila, then difficulty in transportation cannot be ruled out.
4. Located at a distance far away from the capital city which is the greatest consuming area, establishment of manufacturing industries in this region especially the processing industries which should be established around consuming centers, will have great disadvantages in the sale of the products. Cost of the manufactured commodities will have to be raised because of additional transportation cost, and, it is considered to be uneconomical to establish industries far away from business centers.
   In working out a permanent plan for large scale industries, besides considering the above mentioned facts, construction plans for land formation, residential area, transportation and harbor facilities should also be carefully laid out.

In Limay, under the present circumstances, it is however, recommended that certain types of industries which are related to the existing ESSO plant should be established. Investment of industries other than those related to the present existing plants will not justify or

gain any prospective benefits until more careful and long-range studies are made. It is, therefore, considered advisable for the government to limit its public investment at the moment, within the scope of minimum improvement of the existing facilities.

Rosario

This area, in contrast with Limay, is blessed with various favorable conditions.

Water necessary for industrial use is available in the rear where Lake Taal formed a natural dam and the prospect for future development by utilizing this water resource is very promising.

The present situation of the Philippine industry is based on the advantages of natural resources and harbor conditions as in the case of Iligan and Davao, and these advantages are only suitable for early development and they are imperfect in the long-range plan.

In developing countries, it is beyond question that the means for future industrial development not only lies in the effective use of natural resources but the upbringing of processing industry is also of paramount importance. It is a general and accepted idea that the upbringing of processing industry should be near the consumption area and to establish such industry far away from it will meet with many limitations. By synchronizing the abundant natural resources with the processing industry, the way to self-sufficiency and support for the whole of the Philippines is foreseeable in the near future and the Philippines can look forward to a day when the processing industry will become the backbone of the country's economic structure and it is beyond any resonable doubt that it will replace the import commodities.

As Rosario lies only 45 km from Manila, the biggest consumption area in the whole of the Philippines, the upbringing program of processing industry which also requires close cooperation of experimental and research institutes will be easily collaborated by the facilities existing in Manila which also is the educational center of the country. The great plain extending from the sea-shore to the inland is sufficiently enough to establish processing industry,

also, in time the accumulation of processing industry has increased, the basic industry which supplies basic materials will no doubt approach the accumulation area. A further advantageous conditon in the area is that when the quick progress in industry has made it inevitable for reclamation of new land, then the neighbouring sea which is quite shallow can promise to a big area of land with no big capital involved.

Japan is recognized in the world for her technique and scientific knowledge int he reclamation of land from the sea, and numerous industrial areas in Japan are situated on such man-made lands. The patterns of instituting industry on reclamation land is taking shape at increasing tempo in many countries, and the Philippines can, without exception, follow this trend in the future when the need arises.

Iligan

The City of Iligan is claimed for its advantage in seceriving low cost electricity from the Maria Cristina Power Station which utilized the abundant water resource of Lake Lanao and it also has a deep seaboard which is advantageously economical in constructing harbor facility. In addition, carbide, ammonium sulphate and other electricity consuming industries and cement, flour mill and other natural resource type industries are already existing; besides, the construction of NASSCO integrated Steel and Iron Mill on a loan of $62,000,000 from the U.S. EXIM Bank has been decided.

The existing industries in Iligan follow the pattern in the rest of the country i.e. basing exclusively on industry utilizing natural resources. The supply of labor is limited to the City of Iligan which has only a population of fifty to sixty thousand and it is also inadequate in supplying various varieties of labor. Already the existing industries in Iligan have absorbed a big share of the labor force and consideration must be given to the future supply of labor. There is no big consuming market on Mindanao Island and much of Iligan's products are transported to distant Manila which is recognized as the central consuming market in the Philippines. The costs and time consumed in transportation certainly do not credit Iligan to be in a favorable competitive position with Rosario.

To greatly develope a country's industry, attention should be drawn to the processing of the basic industrial products through various processing plants, and manufacture them into consumers' goods before marketing them to consuming area where they will be absorbed. The industry in Iligan thrives mostly on the basic products and it is different from the industrial area centered around Manila where processing plants are abundant. However Iligan can take pride in its low cost power supply and this is considered to be its main feature on the island.

Davao

Davao which has a population equivalent to a medium size city, established itself on industries which utilized mainly agricultural resources such as lauan, coconut and ramie etc.

However, in spite of the fact that lack of essential mineral resources and labor force in the region has prevented it from developing industries other than those relying on the agricultural resources, Davao, with its good sea-board, can well be developed into a sea-port equipped with harbor facilities like those of Limay and Iligan, and blooming into an industrial center when the Mindanao Development Program is being actively implemented.

Part VII

Predition of Probable Types of Industries.

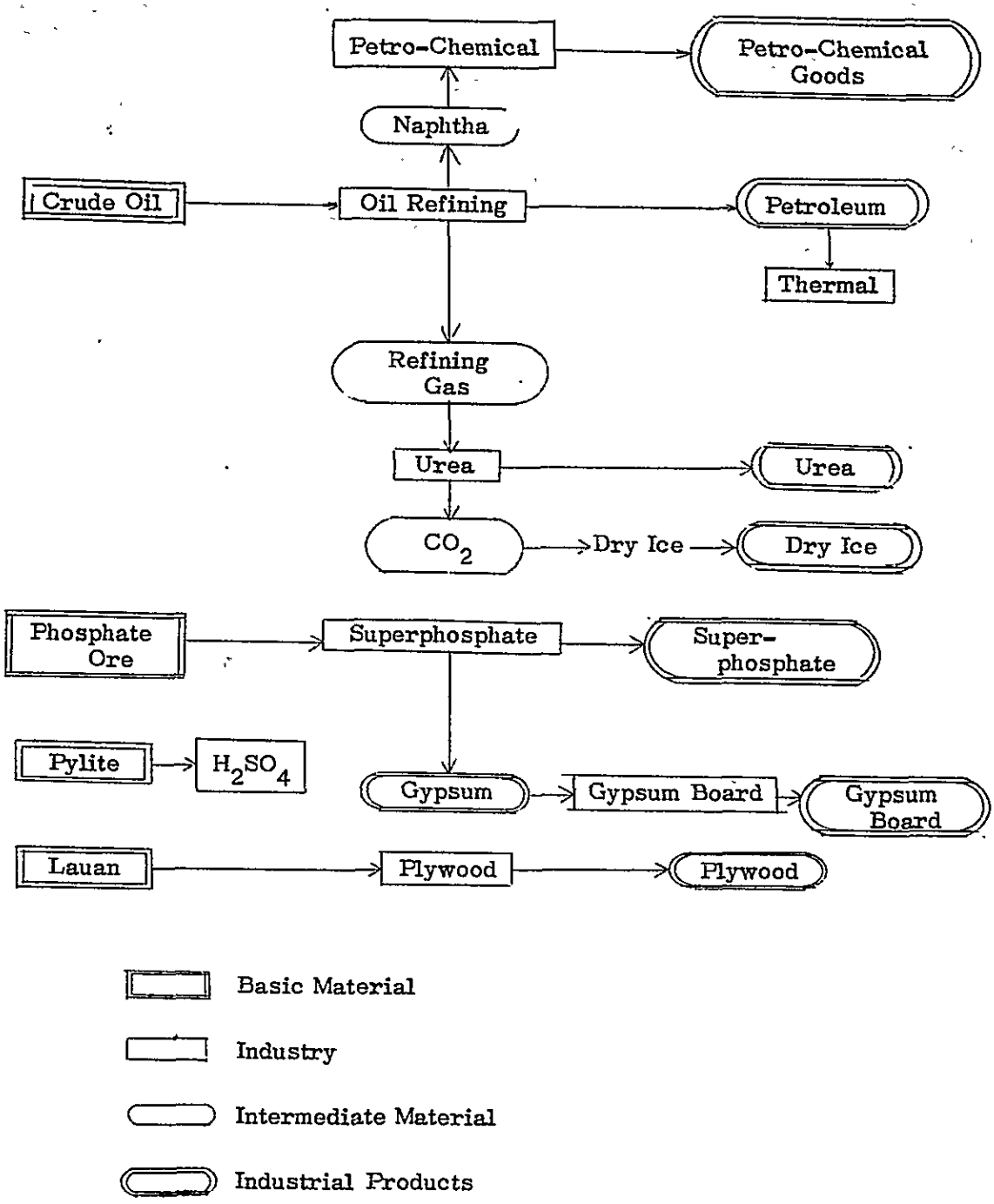
(Long-range plan)

The Survey Team selected Limay, Rosario, Iligan, and Davao as its objects of survey for future industrial development sites on the basis of their geographical conditions as outlined in Part VI. The prediction to be reported in this Part is wholly based on materials received, surveyed and scrutinized by the Survey Team. It is believed that there are bound to be inevitable loopholes exist in this part and reservation is opened to future revision in accordance with further studies and analysis.

It is mentioned in previous part that Davao can be effectively developed on its agricultural processing industry, therefore, this part does not deal with Davao considering its little effect in implementing overall development program for a certain short period to come.

Limay

Unlike Rosario which is in the vicinity of Manila where its thick population can absorb the bulk of processed goods, Limay, because of its geographical position and distance from densely populated city, can best develope its industries within the scope of those directly related to the ESSO Oil Refinery already in existance. The following Chart shows the kinds and types of industries that will prosper in Limay.


Petro-Chemical
Petro-Chemical Goods
Naphtha
Crude Oil
Oil Refining
Petroleum
Thermal
Refining Gas
Urea
Urea
CO_2
Dry Ice
Dry Ice
Phosphate Ore
Superphosphate
Super-phosphate
Pylite
H_2SO_4
Gypsum
Gypsum Board
Gypsum Board
Lauan
Plywood
Plywood
Basic Material
Industry
Intermediate Material
Industrial Products

The present output capacity of the ESSO Oil Refinery in Limay is at 25,000 BSD and future plan will accelerate the capacity to 50,000 BSD. It is estimated that the total oil refinery capacity at present stands at about 100,000 BSD and there is a thirty percent surplus in its gasoline for domestic consumption. The plan to increase ESSO capacity to 50,000 BSD is still expected to be of a distance away and output above that figure is not being contemplated now and this report only based its findings on 50,000 BSD.

The groundlevelling operation of industrial site for chemical fertilizer plant, and construction of special pier for loading of phosphate and pylite are gradually taking shape and the plans of urea and sulfuric acid type fertilizer plants are contracted by the ESSO fertilizer concerns. In view of the above facts, this report here will only deal with those points related to the question of industrial sites for industries other than those mentioned above.

1. PETROLEUM CHEMICALS

Petroleum chemicals are manufactured out of naphtha which is produced by oil refinery, and their production scale depends mainly on the output capacity of oil refinery. The output of ESSO refinery is at 25,000 BSD and the production scale of ethylene derived from naphtha is 22,000 metric tons per year which is not considered economically feasible under present international competition. The production scale of ethylene in Japan is set at 100,000 metric tons per year per plant. Petroleum chemical industries can only be considered to reach sizable competitive stage when ESSO refinery capacity is raised to 50,000 BSD. They will be subjected to careful market survey and economic feasibility study to determine priority chemical products to be manufactured among those such as polythylene, polypropeline, synthetic rubber and various chemical pharmaceutical products.

2. COPPER AND ZINC SMELTING

Through copper and zinc refining process out of pylite, sulfuric acid is obtained from its exhaust gas, or from sulfuric acid gas by calcinating pylite leaving clacinated ore which contains copper and relatively high zinc ratio. The former is primarily for the purpose of copper refining, while the latter is aimed at producing sulfuric acid. Preference between the two is generally determined whether the amount of calcinated ore can justify the economic feasibility of copper refining. In the process of manufacturing sulfuric acid, calcinated ore has, in general practice, secondary importance and is usually destined for disposition provided it can find its market and users. Proposed fertilizer plant in Limay is primarily for the purpose of manufacturing phosphate type fertilizer and with its annual production of 30,000 metric tons of super phosphoric acid, only 6,000 tons of copper can be refined from pylite whose scale may not be competitive in the world copper market.

Furthermore, more basic and further studies are required to revalue and substantiate whether Limay can shoulder copper refining from various angles such as distribution and reserves of mineral resources.

The sites for oil refinery expansion and chemical fertilizer plant are presently available in Limay, and establishment of new sites for dryice, plywood and gypsumboard factories do not justify planning which requires substantial public investment. It is predicted that the supply of land for the above factories will pose no problem at all.

3. OTHER INDUSTRIES PROPOSED

Among those proposed industries such as plywood, gypsumboard, pipe making factories and sales shops, no difficulty is anticipated to establish plywood factory provided logs are delivered at reasonable transportation cost from its origin to Limay taking into consideration plywood factory does not require extensive varieties of labor and especially its short distance to main market and its export origin, Manila. Limay is also favored for the gypsumboard industry which utilized by-products of phosphate type fertilizer. However, Limay does not provide enough demand for pipe making, cast iron and machinery sales shops.

By viewing the above facts, a classification of industries to be established in Limay is shown below:

Present Industry	Products or Capacity
Oil refinery	50,000 BSD (Existing)
Chemical fertilizer	Urea, sulfuric acid, phosphate fertilizer (under construction)
Dryice	Dryice (New industry)
Plywood	Plywood (New industry)
Gypsumboard	Gypsumboard (New industry)
Future Industry	
Petroleum chemical	Unknown (New industry)

ROSARIO

Rosario is situated on an area about 45 kilometers from Manila and it has an extensive shoreline suitable for coastline industrial site and its great plain on the inland side is also spacious. This area holds the potantial key to the combined and integrated industrial area comprising both basic and processing industries in the Philippines. The FILOIL refinery is presently the only industry of sizable dimension in Rosario, and the rest of the land is still in virgin stage in the sense of industrial development. Taking into consideration the potential advantages of Rosario, however, the immediate step to be taken is to introduce processing industries to Rosario especially those which are concentrated in Manila. It is proposed, therefore, an extensive development project for Rosario be established making the best use of its geographical advantages.

A fertilizer plant of ammonia type can possibly be developed, however, it may not be economically feasible with its present oil refinery capacity which is only 17,000 BSD. Until it is substantially raised to such an amount by which it is justifiable to conduct a more extensive studies, this matter is temporarily set aside. It is understood that FILOIL has its own industrialization program for Rosario, however, the Survey Team was not properly informed of its details and furnished with enough data and materials to make any commitment and comments.

ILIGAN

Iligan has been developed mainly on its low cost electricity which supports industries such as carbide, ammonium sulphate and also natural resource type industries such as cement, flour mill and others. Chlorine is manufactured through salt electrolysis at the carbide factory, and plan is also set to manufacture cholride vinyl by combining accetylene made out of carbide. NASSCO has been granted a loan of U.S. 62,000,000 dollars from the U.S. EXIM Bank to construct an iron and steel mill with an annual production of 230,000 meteric tons. It may be said that a substantial ground work in Iligan has already been completed basing upon its natural resources and electricity consuming industries.

The Survey Team believes that it is worth touching on the proposed aluminum project. To produce one metric ton of aluminium, about 19,000 KWH of electricyty is needed. (Electricity rate in the U.S. and Canada is 0.8 centavo per 1 KWH). Aluminum industry is expected to be quite feasible in Iligan with its low cost electricity supply from Maria Cristina together with bauxite from neighboring countries like Malaysia, Australis, and Indonesia. Aluminium industry as well as plywood can possibly be furnished with competitive power in the world market. The following table shows the comparison of the costs of aluminium manufactured in the Philippines with Malaysian bauxite with that manufactured in Japan.

	Japan (A)	Philippines (B)	
Cost of freight	60 pesos	30 pesos	30 pesos
Cost of electricity	530 pesos	260 pesos	270 pesos
Total	590 pesos	290 pesos	300 pesos

Assuming that other costs are about the same in the Philippines and Japan, the cost per one metric ton in Japan is 1,700 pesos, and that in the Philippines is 1,400 pesos. The cost of the

Philippine aluminium will amount to about 1,600 pesos per metric ton with 15 percent of profit and sales expenses included, and this amount will still be on a profit margin when freight charge to foreign country is added.

The following table shows the price of the Philippine aluminum when exported to Japan and European markets. Being export countries, the U.S. and Canada are excluded.

Market	Freight from the Philippines (estimated)	Philippines (C & F)	Market Price
Japan	57 pesos	1,667 pesos	2,000 pesos
West Europe	83 pesos	1,693 pesos	France: 1,776 pesos Britain: 1,786 pesos West Germany: 1,854 pesos Italy: 2,030 pesos

As shown below, the statistical figure of the world production of aluminium (excluding Communist countries) is increasing at an average of 200,000 metric tons per year. In this respect, aluminium industry as a whole is considered as an industry of prospective future.

1950	1,495 (in thousand tons)
1955	2,710
1960	3,780

It is feasible by judgement of the above facts that the aluminium industry will greatly help the long-range industrialization of the Philippines.

The following is a list of problems requiring careful consideration in the manufacture of aluminium:

a. To set the figure of aluminium production at 25,000 metric tons per year in the Philippines is too small comparing with international standard. For example, excluding the world's four major producers, the average output capacity per factory is about 30,000 metric tons per year. Newly constructed aluminium factories in Japan are aiming at 50,000 metric tons per year as their production goal.

b. The supply method of caustic soda in the refinery of aluminium. (one ton of aluminium manufacturing requires 0.2 metric soda). This problem does arise if proposed 25,000 metric tons of annual output of aluminium cannot utilize caustic soda produced by the carbide factory in the Philippines. (capacity: 5,000 metric tons per year). It offers no problem provided caustic soda produced from the existing carbide plant can be utilized for the proposed aluminium factory, however, the disposition of chloride may give a certain extent of bottleneck if aluminium factory has to find its own source for caustic soda. It is believed that the sale outlets for chlorine will meet no obstacle in view that it is used as chemical material for vinyl chloride, insecticide, dyestuffs and chemical pharmaceutical products and also in synthetic fiber, bleaching powder for paper, and as disinfecting agent in reservoir. But if chlorine cannot find its immediate market easily, the production cost per one metric ton of aluminium will increase by about 30 pesos and its export price to western Europe, for instance, will amount to 1,723 pesos which is considered to be an unfavorable price in world market.

c. The world supply of aluminium is already in a surplus stage, e.g. the 1961 Free World production was 4,303,000 metric tons compared with a consumption of 3,425,000 metric tons, and that accounted for a surplus of 878,000 metric tons. It is anticipated, therefore, that the aluminium industry in the Philippines will meet considerable obstacles to build itself into an export industry for international market.

As stated above, the aluminium industry, having potentiallity to be one of the competitive industries in the world market, offers prospective future and further detailed studies of its development are highly desirable. The low cost electricity (1.3 - 1.4 centavos per 1 KWH) and advantageous harbor conditions of Iligan are favored for the establishment of aluminium industry.

Besides aluminium, other industries such as lumber, plywood and paper mill which utilize the wastes of lumber yards are feasible to be developed in the future, and it is also probable that small scale industries such as food processing plants, repair factories and others which will serve local needs can be introduced into the area. It is still too early under the present Philippine industrial circumstances to forecast the possibilities of establishing industries above medium scale to utilize the hilly inland area.

Therefore, the present and immediate future prospects will not justify substantial public investment since aluminium and paper industries will have potentialities to find ways and means to establish themselves in the future. Furthermore, small scale industries mentioned in this report will not require extensive sites for their establishments.

Part VIII

Assumption of Appropriate Industries for the Industrial Estates.

There are two ways to find out the appropriate industries for the established estates. They are:

(i) assumption based on a relatively short insight of the change in economic structure, and

(ii) assumption based on long-range plan of the structural change in the economy of the country.

However, in the above assumption, proposed location and scales of the estates should also be taken into consideration. The structural change in output by industries in the economy and rate of increase in output are shown in Table 9, 10, and 11.

In the rate of increase in output as shown in the above Tables, foodstuff, textile, paper and pulp, rubber goods, chemicals, metal-products and machineries showed an overwhelming 80 percent increase. From the Graph 3, showing the trend of Import and Domestic Production of the above items, it is evident that the amount of import in each of the mentioned items is inversely proportional to the change in domestic production.

Judging from the existing international economic structure, this trend will continue in the same direction for some time, therefore, it is considered most feasible to establish the industrial estates for production of import-substitute-commodities which will be mainly for domestic consumption; and it is not exaggerating to predict that the majority of the industrial estates will be concentrated near Manila. If this tendency in the economic development is taken as an incentive for the establishment of industrial estates, and if the Herschman pattern of aggressive investment is used to plan a substantial change in the economy, i.e. to strengthen the basic components of the economy, then it

is only logical to select those industries, which are considered to be able to survive in severe international competition, by screening through careful and thorough studies of technical feasibility. The establishment of industrial estates in big scales and the encouragement of those hypothetic industries as proposed by PIA will no doubt promote and facilitate the long-range project, however, from the view point of short period policy based on the present Philippine economic structure, the establishment of industrial estate surrounding Manila for the production of consumer-goods will be considered urgent and of immediate importance. (Refer Table 12)

Part IX

Adjustment Plan for the Industrial Area

1. Adjustment plan for the industrial area.

In the industrial area where concrete plan for the construction of factories has been adopted, the adjustment plan for the surrounding environment should also be planned together with city facilities according to the nature of the industries to be developed.

For the adjustment of environmental conditions in the industrial areas, necessity of public investment, with which the most effective planning for the area will be decided within the possible extent, may arise. In the case of industrial area, which is being planned within a certain sector in the city, the planning of facilities inside the industrial area should be adjusted in such a nature that it will be closely related to the city itself. The allotment of transport facilities should be specially planned according to the conditions in the industrial area, such as the transport of raw materials, fuels and manufactured products. Besides the establishment of effective connection with port facilities and markets, the importance of adjustment of roads should be investigated according to the nature of the factories and their scales, and, also, from the interrelationship between facility arrangement and the industrial area. Construction of roads should then be planned according to the most effective form of utilization.

(i) Transportation facilities and new born traffic.

Transportation of raw materials, manufactured products and workers are of vital importance in the industrial area. Bus will be used to transport workers living far away from the factories, and means of connection with main trunk line when they are far apart from the industrial area should also be considered. As the construction of roads depends largely on the volumes

and routes of traffic, the distribution of industrial area should be considered from the points of the nature of factories which form the industrial area, and the network and volume of traffic viewed from the region as a whole.

(ii) Utilization of green belt.

In addition to the consideration given to geographical conditons such as port facilities, roads and industrial water which are the most fundamental factors to determine an industrial area, facilities for the city environment and residential areas for workers which will be inevitable in the progress of development in the industrial area, should also be considered.

The utilization of green areas serves as a means to protect workers from hazard of ill-health resulting from factors such as noise and smog which will disturb the comfortable living of the people.

Establishment of recreation facilities, sport-grounds and parks is generally practised in green areas. As a whole, the Philippines is covered with ever-green vegetation, it will be possible to develop green belt within the industrial area which will serve as natural screens separating the factories from residential areas. The existance of green belts within the industrial area does not only shut out noises, smog and dust from the factories and relieves the inhabitants from breathing of unpleasant air but also prevents the spread of fire in fire break-outs.

The existing trees in the factory area should be preserved as much as possible. Green belts along the roads for transportation are necessary to maintain the efficiency of driving and safety.

2. Industry-distribution plan for Industrial Area.

(i) Factory-distribution plan.

Plan for the allotment of factory-sites should be drawn from the nature and functions of the factories and the traffic volume they

produce. And, the plan should then be proceeded with consideration for the following:

(1) Limitation of the investment, needed for public facilities, to its minimum.
(2) Limitation of traffic volume, produced by the factories, to its minimum, when viewed from the region as a whole.
(3) Promotion of efficiency of each factory to its maximum and prevention of it from being interfered by the operation of neighboring factories.

Figure 1, shows the grouping of factories and its combination with public ground. Figure 2, shows that factories are being constructed in rows instead of concentrating on a certain point. Public ground which will provide parking space as well as scenic appearance for the area is also shown. In areas where factories are being planned in big scales, it is not only necessary to line the factories collectively as in Figure 2 but also necessary to allot public space for vehicles and other facilities such as water tower, sub-station, sewerage, service-centers, and welfare-center, etc.

Figure 1

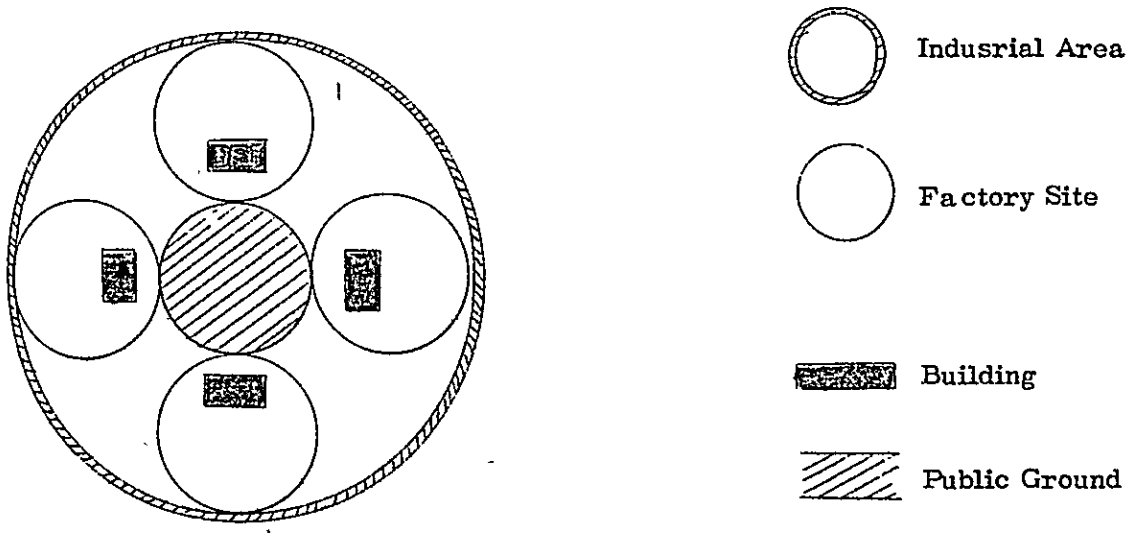
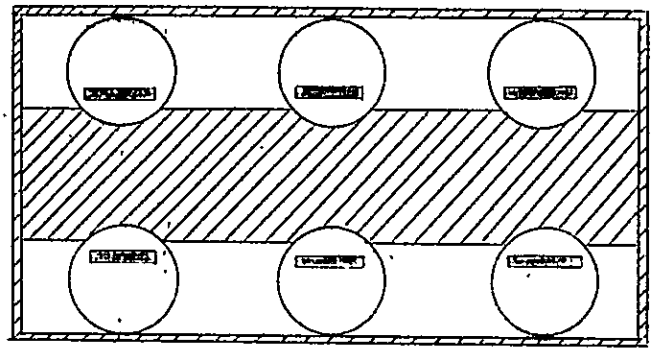


Figure 2



In Figure 3, where pier facilities are being considered, besides the provision of loading and unloading, and public grounds, space for strorage are also being considered. Figure 4, shows the roads leading to the industrial area where direct lines connecting with trunk line do not exist.

Figure 3

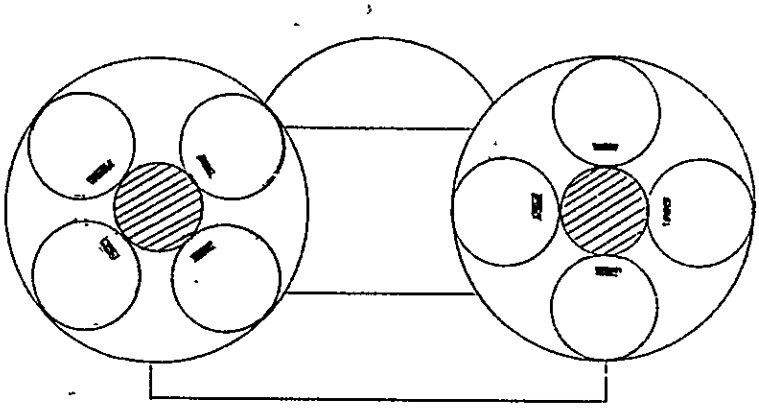
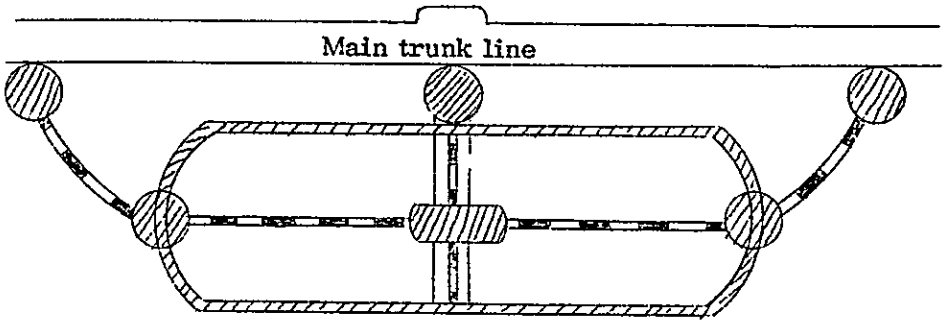


Figure 4



Interconnection road .

Part X

Distribution plan for the proposed sites.

Limay

The establishment of industrial sites in Limay should closely related with the existing ESSO oil refinery plant, which will serve as a center for further development project. As Limay is located opposite of Manila, transportation will be mainly by sea, therefore, its development largely depends on adjustment of port and harbor facilities. And, the harbor for mooring if developed into a depth of -5.5 meter will be sufficient to handle cargos for a certain period of fine to come. As Limay port possesses potentiality for expansion in future development, the adjustment of facilities should be re-examined in accordance with further development plan.

1. The adjustment of roads will efficiently handle the volume of traffic and also will help raising the efficiency of industrial development program.
2. Construction of main regional roads and the coastal road to facilitate transportation to the harbors should be so planned that efficient communication with the residential area together with the green belt areas would be obtained.
3. Investment for establishing facilities to separate the existing towns and villages from the industrial area should be minimized by careful city planning, and other facilities should be drawn in accordance with thorough surveys for amount of water available and its utilization.

Rosario

Besides the facts that Rosario is in short distance from Manila, the consuming center, and its easiness in constructing port and harbor facilities, the plan for vast regional development based on land owned by FILOIL in Rosario as the center of industrial regions will have great influence on the basic policy for future industrial development of the Philippines. The direction for industries in the development of industrial area should, of course, be examined from the point of the relationship between industries and location, and the availability of resources, and further, relationship between port facilities and water-supply for coastal industries with the city-facilities should also be considered, and long-range and constructive plan for development of vast region should then be drawn. Plan for adjustment of city environment which has close relationship with daily life of the population and its industrial activities is also necessary.

As Rosario is blessed with the most suitable natural conditions for coastal industries, development of heavy industries such as ship-building and iron-smelting together with iron-copper integrated industry and petroleum refinery are considered feasible. The development of various industries can be planned in the ratio of 1:2 of coastal and inland industries respectively.

If areas stretching from north to south along the coastal line are being developed as industrial area for coastal industries, then, the transportation of raw materials and manufactured products will be convenient because moorage is possible and easy, and also connection between the coast and inland will be closely maintained. Besides, by using the present first grade roads, inland transportation connection will be possible.

a. Assumption of coastal industries.

Owing to the limited information concerning the conditions of soil and meteorological observations which are necessary for harbor

construction works in coastal industrial land, only a rough and tentative presumption is drawn as indicated below.

The total plan in the following table consists of possible utilization of 1,000 hectares of land of +4 meters, reclaimable with 75,000,000 m^3 of soil by dredging. Ships of 1,000 tons will be easily moored if the depth of the front of the reclaimed land is being planned at -5.5 meter. Also, if pier facilities are properly provided, ships of 20,000 to 50,000 tons can also be moored because the land after it is reclaimed will be very near to a depth of -15 meters.

	Quantity	Unit Price	Amount	Remark
Reclamation	75 million/m^3	140 yen/m^3	10,500 mil.yen	Height +4m
Embankment	8,5000 m	200,000yen/m	1,700 "	Riprap
Breakwater	4,5000 m	500,000 "	2,250 "	Rubble-mound
Survey			300 "	Soil Survey, etc.
Sub total			14,750	
Overhead			2,950	
Total			17,700	

The above plan dealt only with the reclamation of land.

Because of many uncertain factors, it is only a rough estimation and, as the costruction work itself is not difficult, its implementation plan should be considered together with the establishement of a total plan for regional development.
Commencement of construction works and the establishment of other facilities should be planned after further investigations and studies are made accordingly.

b. Distribution plan.

Industrial area should be confined to a certain zone within the city, and the important factor relating to the connection between its facilities with those of the city itself is that it must be considered

from the point of scale and distribution of public facilities which will maintain a good environment for the efficiency of labor as well as transportation.

1. In area where industrial site is to be developed, construction of roads communicating with the first grade roads passing through Manila is necessary to handle new traffic volume produced by the industrial areas.

2. Construction of roads should be planned according to the most effective method of handling the traffic volume based on the general conditions, and the interrelationship between the nature of the industrial land and the traffic volume.

3. Figure 4, shows how the width of the roads communicating with the first grade roads will be constituted. Besides including the plan for factory-sites, spaces for central green belts, parking and other facilities are being added. Width of the interconnection roads within the industrial area should be constituted according to the convenience of the factories concerned.

4. The construction of communicating roads connecting the factories with the newly constructed residential areas for workers, and, development of green belts, parks and other facilities, separating the existing towns and villages from the factory-sites is also necessary.

Iligan

As Iligan will be the main center of industrial development in Mindanao, its products and resources available in the region should be analyzed in regards to its locational relationship with the regional development program. A constructive plan should be drawn basing upon major industrial and geographical conditions such as harbor, coastal utilization, industrial water supply, etc., as the basic policy for future industrial development.

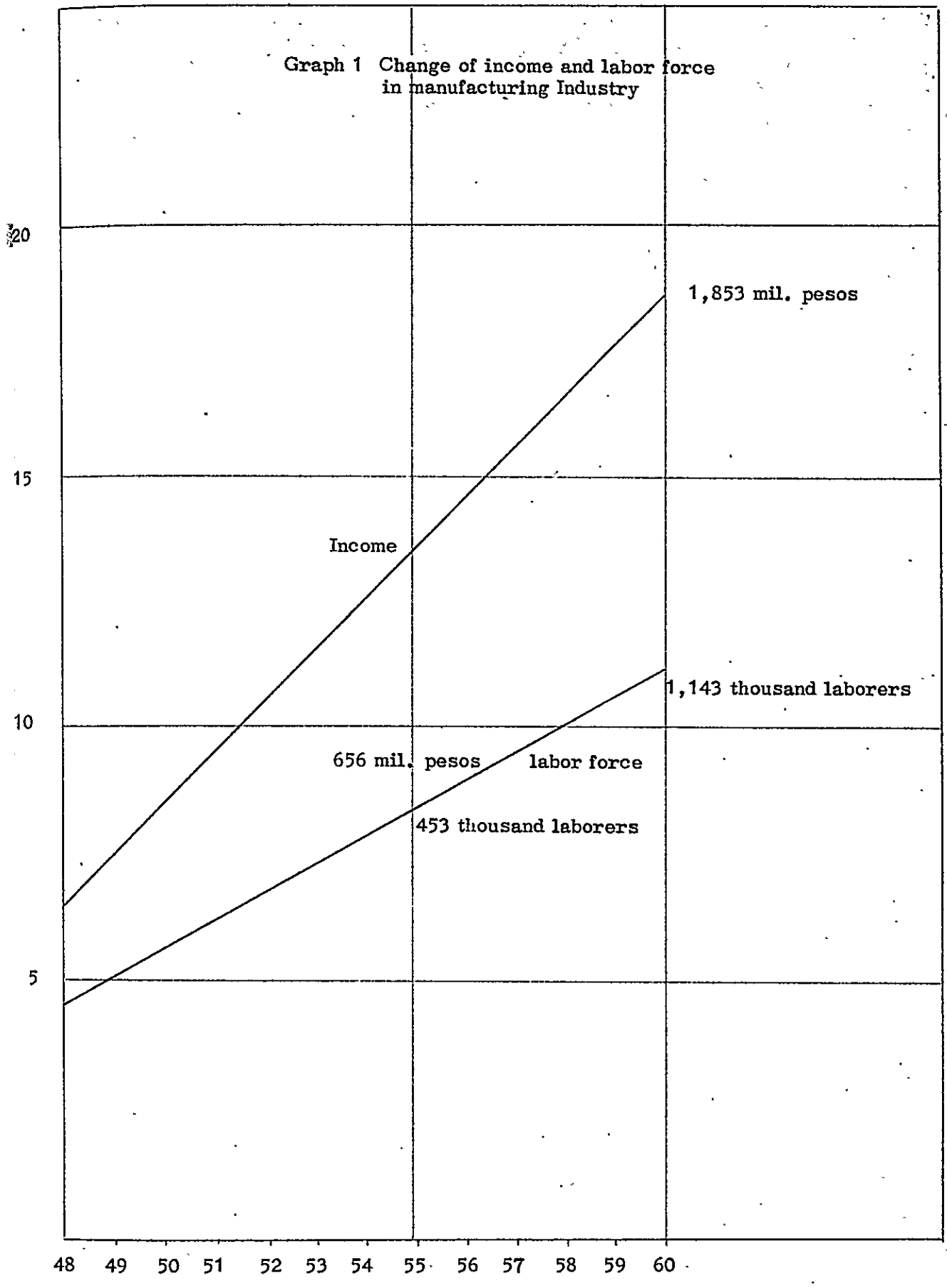
The development plan for harbor, which will be the stepping stone for further industrialization relying on natural resources of the region, will serve as the driving force for the advancement of the progress in the present existing industries as well as industries to be developed, and a careful screening to choose the most suitable types of industries for development of the region is of utmost importance.

1. Development of Kiwalan which is about ten kilometers north of Iligan city, as a port is considered feasible and suitable because its advantageous coastal conditions which provide natural protection against tidal waves, and also its deep water will make construction of harbor facilities possible and easy. Also, camp Overton which is five kilometers north-west of Iligan can well be developed into a good harbor, too.
2. Owing to the availability of only a few plain lands in Iligan, development of coastal industrial areas will be the only answer for further industrialization of the region. The present factory sites are found to have good connection with the main highway route. Areas stretching north-south along the coastal line will be developed into an industrial area, and a development plan including adjustment of the environments will be adopted, taking the existing town area as a center and dividing the region into two parts.

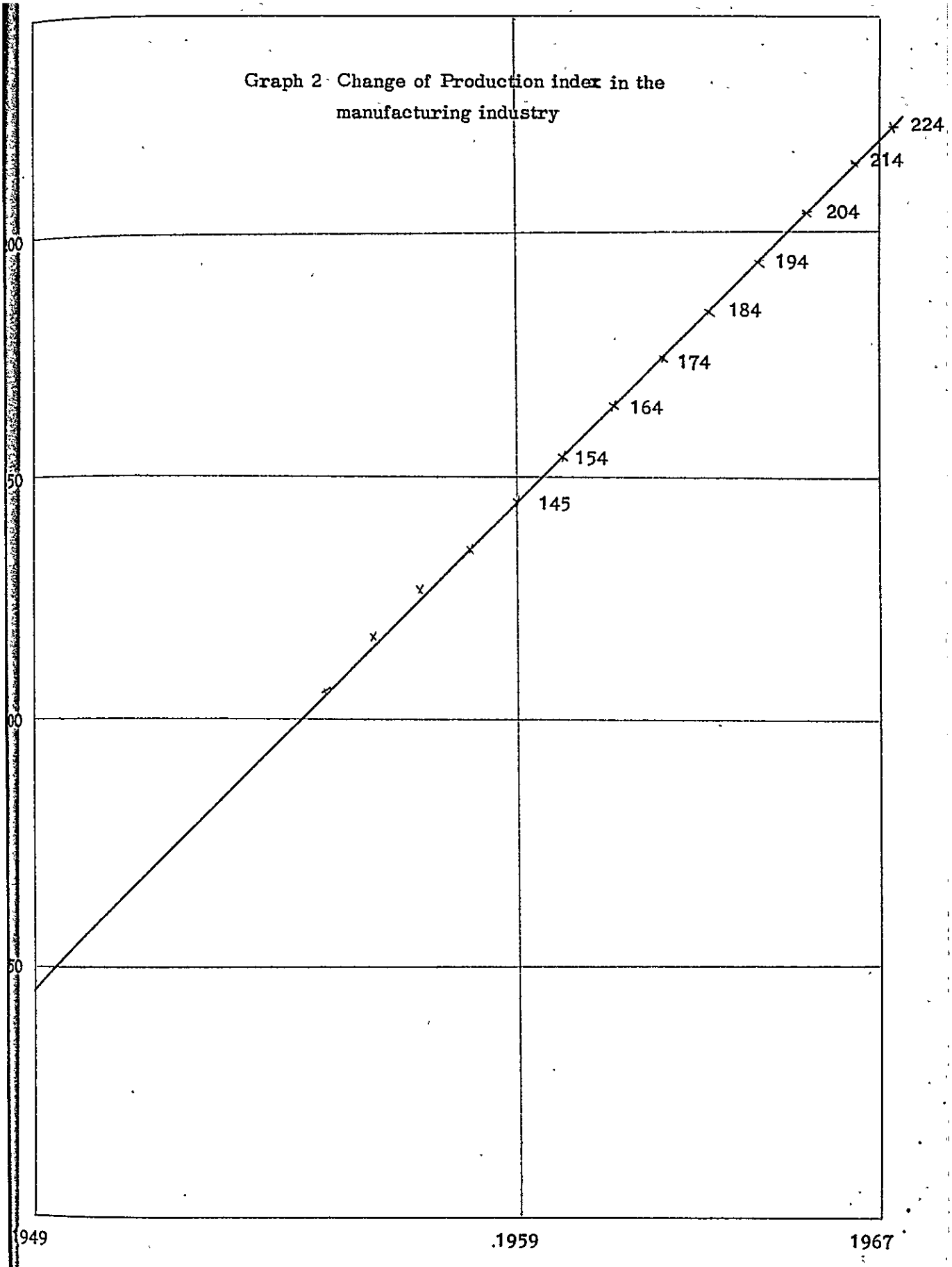
3. In order to accelerate the development of the region, constuction plan for roads to efficiently handle the industrial traffic will be necessary. Roads from factories which will lead to the trunk line within the shortest possible distance should be constructed. Plan for communicating the existing town with the industrial areas as well as residential areas which will be developed around the business center where the industrial areas are being closely connected, should be carefully drawn, so that the city thus developed will function smoothly. In addition, educational facilities for the people should also be planned.

Preliminary master plans for those three proposed sites, Limay, Rosario and Iligan are shown in Tables 13, 14 and 15 for references which will be revised in accordance with more careful studies and further investigations in relation to nation-wide and regional industrialization programs.

Graph 1 Change of income and labor force in manufacturing Industry

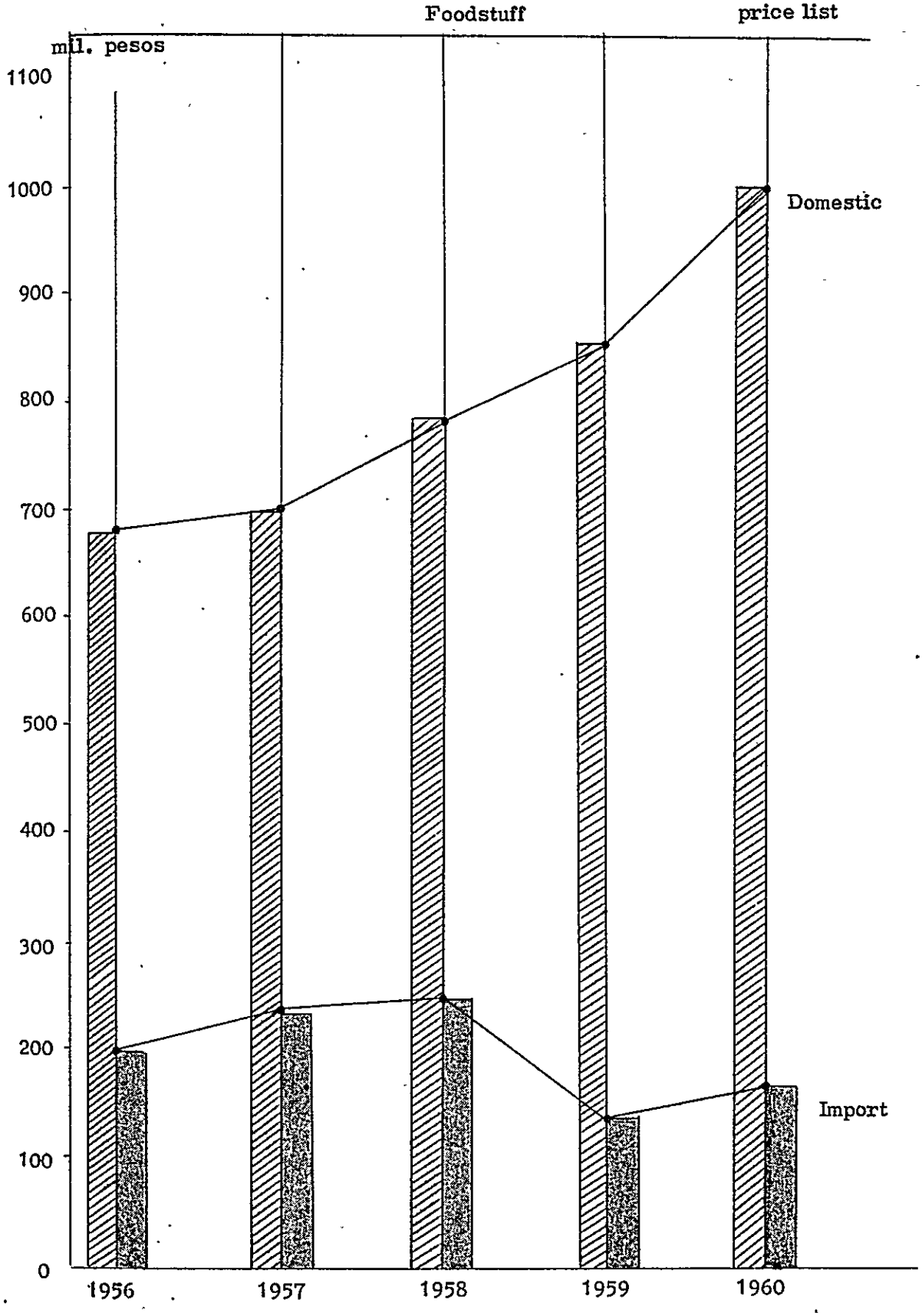


Graph 2 Change of Production index in the manufacturing industry

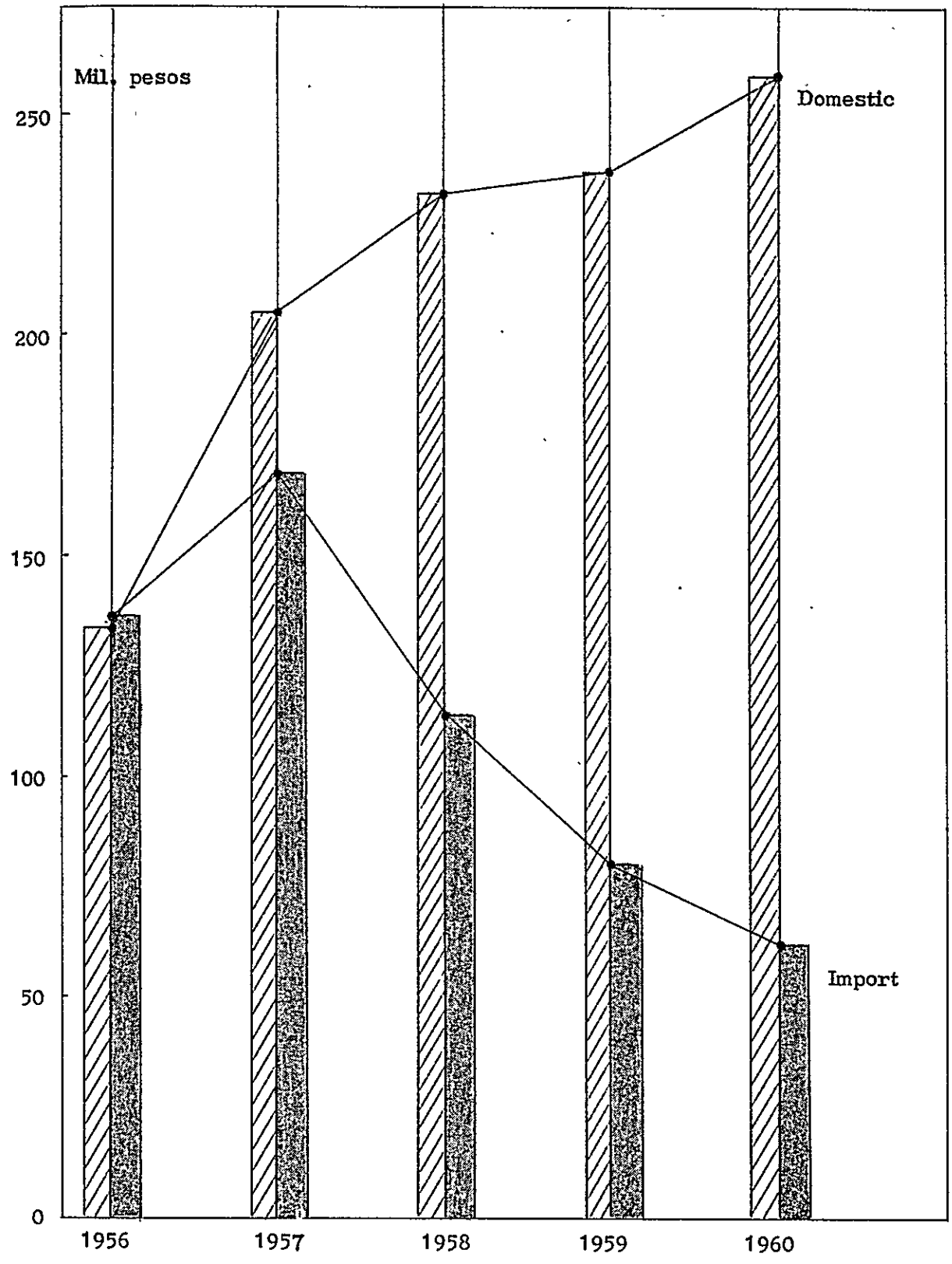


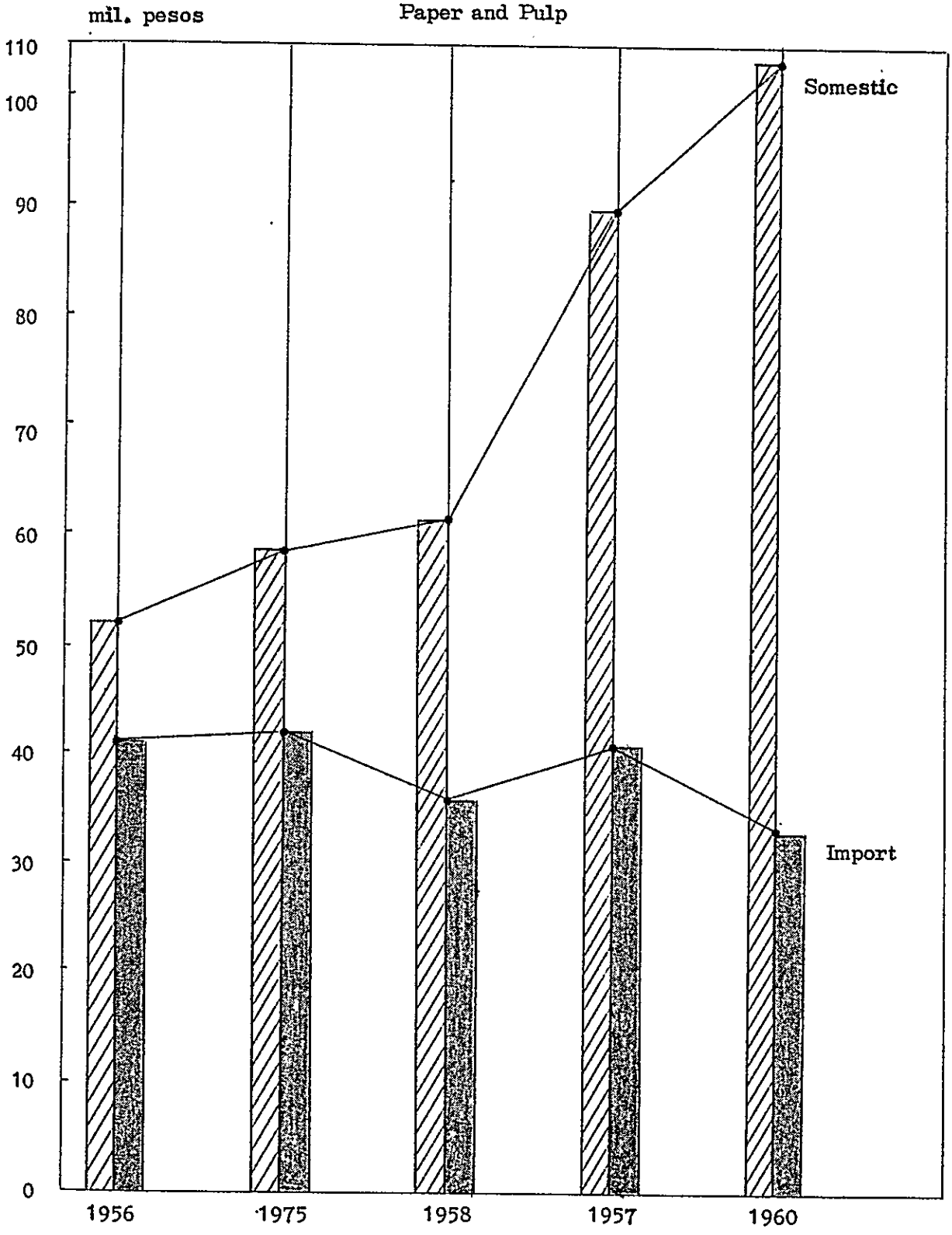
Graph 3 Trend in the amount of Domestic Production and Import of the industrial commodities in the Philippines

Note : All the data are from the 1960 price list

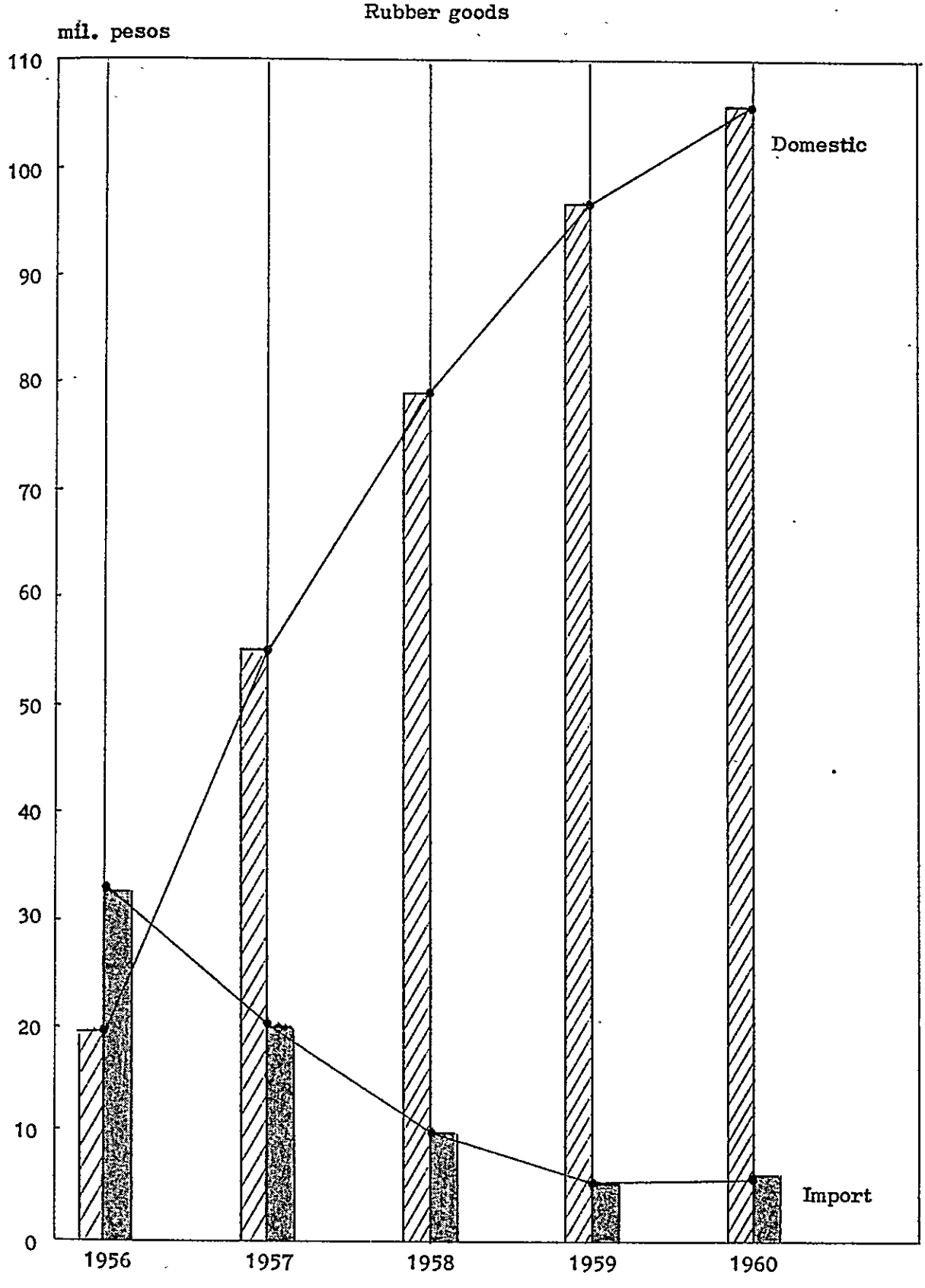


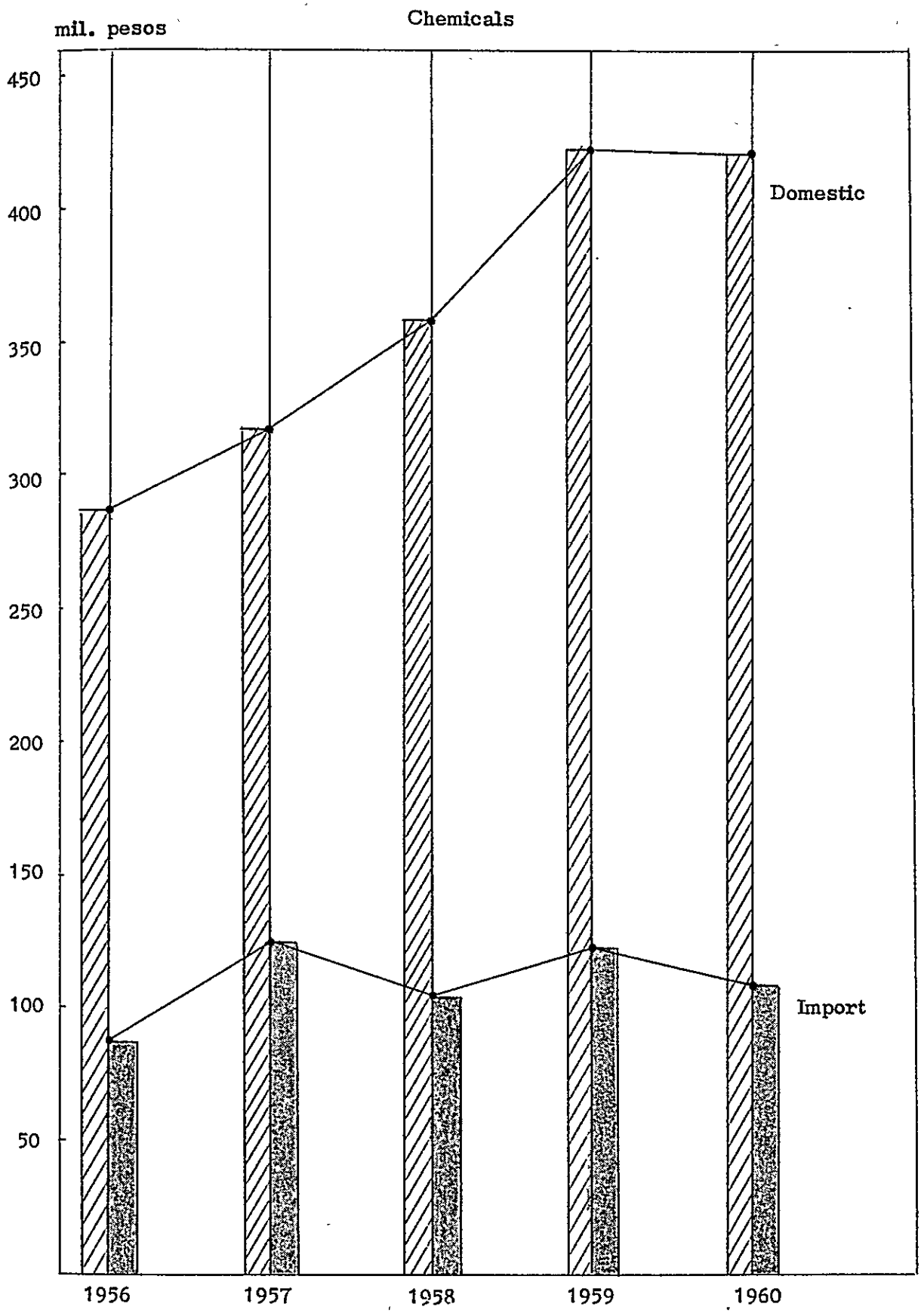
Textile

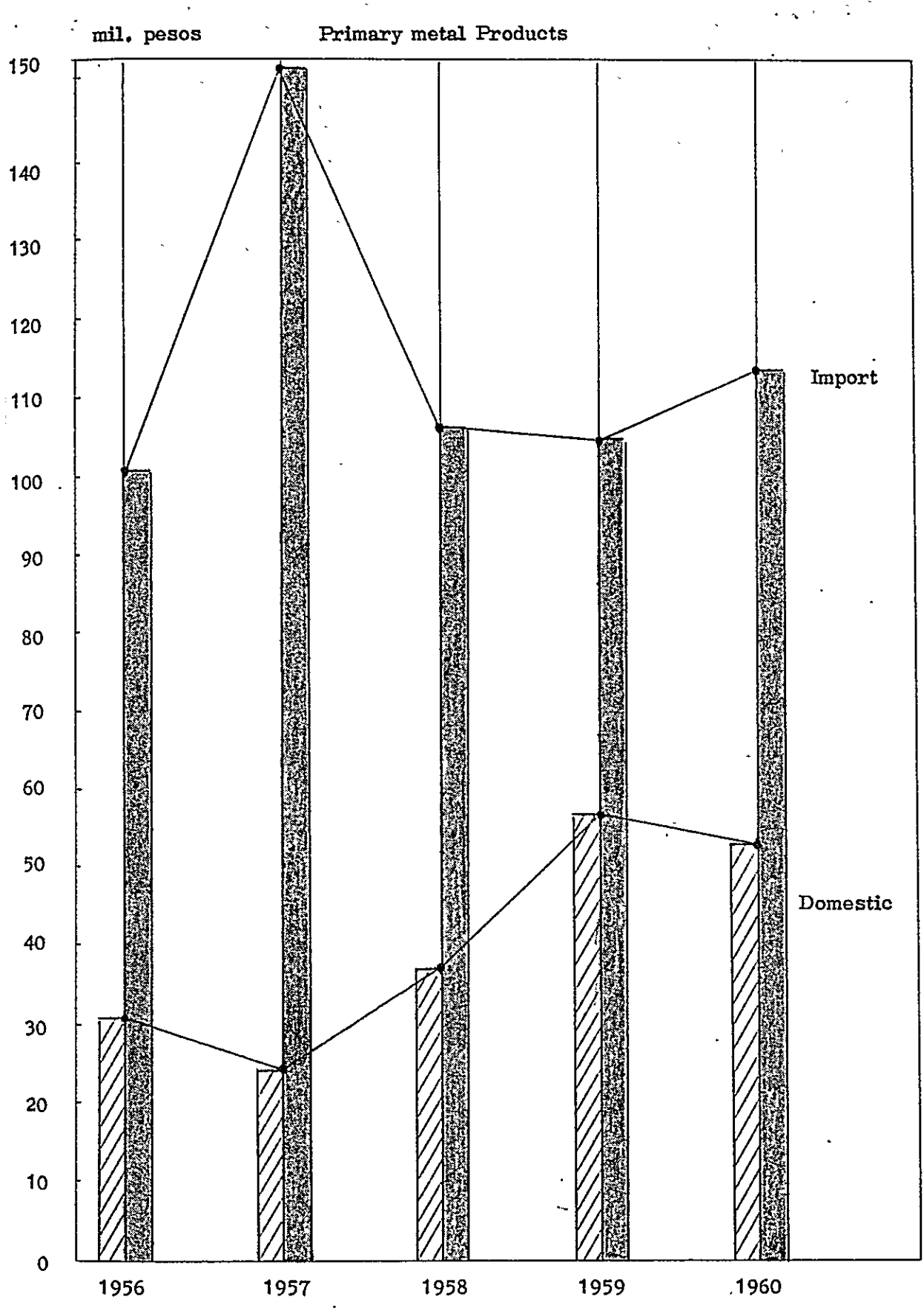

Mil. pesos
250
200
150
100
50
0
Domestic
Import
1956
1957
1958
1959
1960

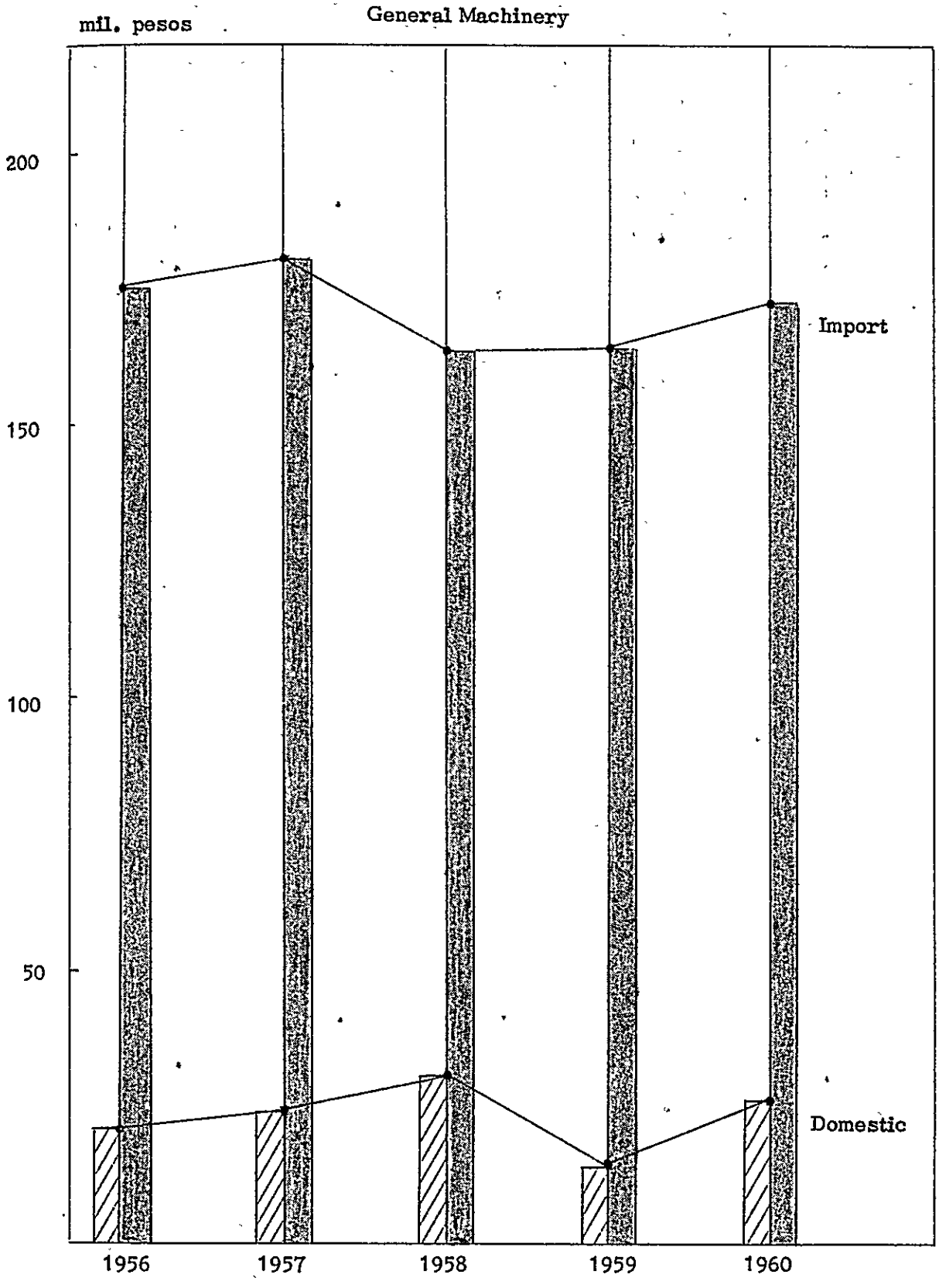

mil. pesos
Paper and Pulp
110
100
90
80
70
60
50
40
30
20
10
0
Somestic
Import
1956
1975
1958
1957
1960

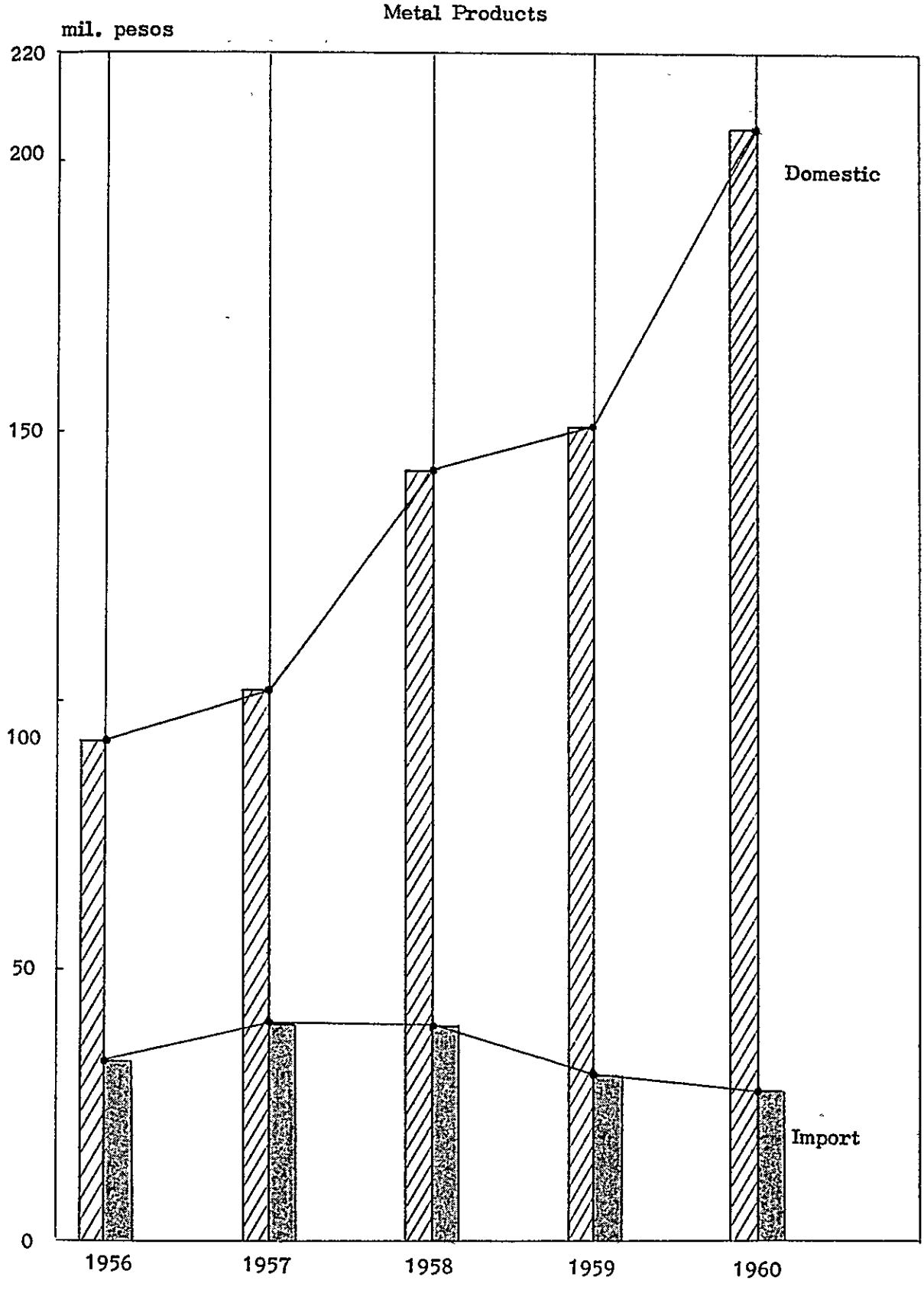
Rubber goods



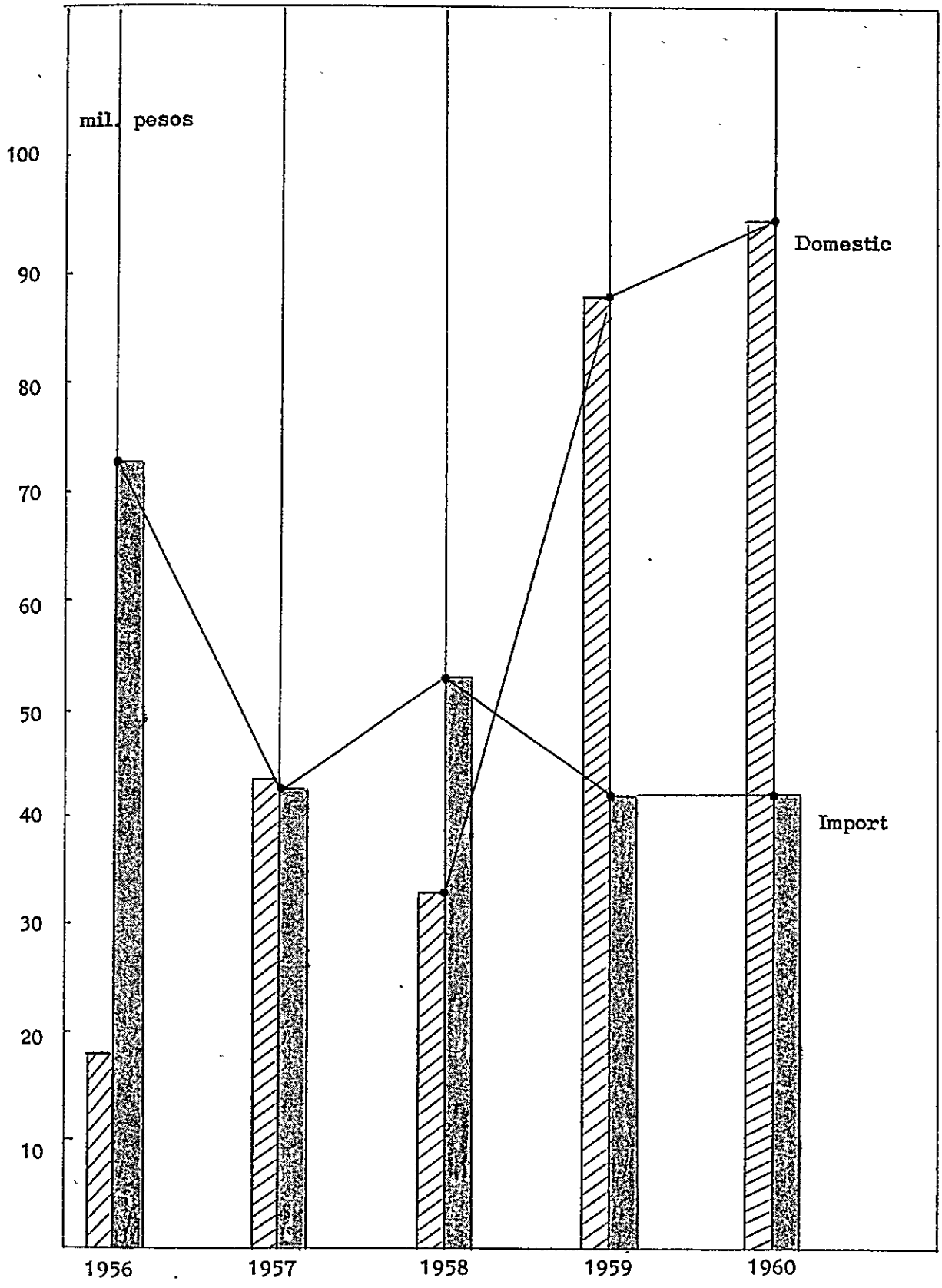

Chemicals
mil. pesos
450
400
350
300
250
200
150
100
50
Domestic
Import
1956
1957
1958
1959
1960


mil. pesos
Primary metal Products
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1956
1957
1958
1959
1960
Import
Domestic


mil. pesos
General Machinery
200
150
100
50
Import
Domestic
1956
1957
1958
1959
1960


Metal Products
mil. pesos
220
200
150
100
50
0
Domestic
Import
1956
1957
1958
1959
1960

Electonics


mil. pesos
100
90
80
70
60
50
40
30
20
10
Domestic
Import
1956
1957
1958
1959
1960

Transport facilities

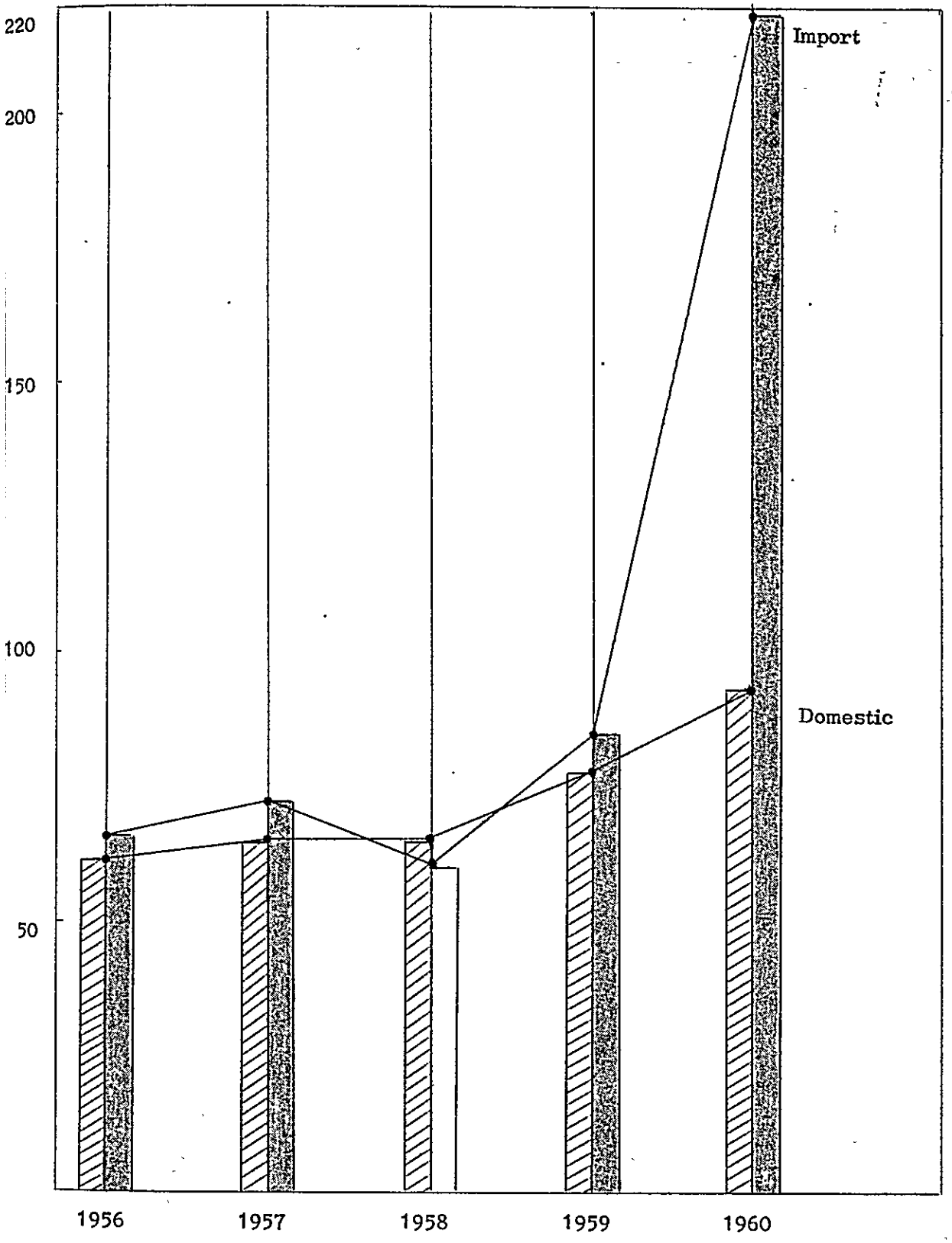


Table 1 Industrial output increase index

(Jan. - Sept. 1959)

Manufacturing Products	146.2
Non Durable Goods	144.7
Foodstuff	137.9
Beverage	133.8
Tobacco	118.7
Textile	255.0
Shoes, Footwear	57.7
Paper Goods	152.4
Printed Matter	130.3
Leather Goods	271.1
Rubber Goods	229.2
Chemical Goods	135.7
Petrol Goal Chemical	179.2
Durable Goods	153.4
Lumber Goods	159.0
Furnitures	105.6
Non-Ferrous Metal	166.7
Cement	187.2
Concrete Goods	297.0
Glass Goods	97.2
Metal Goods	209.5
Machinery	79.1
Electronics	169.9
Transport Facilities	84.9

Table 2 Sales of Manufactured Goods (in 1959)

Unit : 1,000 Pesos

Total	2,970,342
Foodstuff	720,895
Beverage	196,141
Tobacco	192,605
Textile	232,328
Footwear	140,092
Lumber Goods	149,684
Furniture	19,351
Paper & Paper Goods	83,152
Printed Matters	75,378
Leather	9,042
Rubber	97,162
Chemical	376,930
Coal, Petro-Chemical	---
Non-Ferrous Metal Goods	95,758
Basic Metal Goods	54,213
Metal Goods	14 5,023
Machinery	14,605
Electrical Machineries	75,032
Transport Facilities	83,585
Miscellaneous	208,484

Table 3 Investment index by nationalities

	TOTAL	PHILIPPINO	CHINESE	AMERICAN	OTHERS
1951	174,977	113,616	56,610	2,346	2,405
1960	184,855	157,631	24,846	1,375	1,003

Philippine Central Bank

Statistical Bulletin

Table 4 Total value of products sold
(1,000 pesos)

1959

	Enterprises	Employee	Output
Philippine Total	1,858	185,580	2,970,342
Manila	476	43,675	693,066
Ilocos-Mountain Province	21	1,747	15,302
Ilocos Sur	4	594	700
La Union	5	568	11,635
Mountain Province	9	485	2,662
Cagayan Valley	19	1,625	12,273
Cagayan	5	1,077	6,086
Isahela	11	378	4,656
Central Luzon	149	11,207	181,026
Bulacan	83	4,788	99,106
Nueva Ecijia	11	442	4,380
Pampanga	19	2,759	35,423
Pangasinan	20	940	8,705
Tarlac	8	1,221	30,109
Southern Luzon	845	84,127	1,482,910
Batangas	57	2,824	188,676
Cavite	5	604	1,614
Laguna	21	4,275	64,022
Quezon	15	3,567	30,561
Rizal	737	71,917	1,192,888
Bical	27	1,513	10,663
Albay	13	272	1,175
Camarines Sur	9	1,067	6,979
Western Visayas	85	18,362	294,139
Iloilo	29	1,445	16,119
Negros Occidental	42	13,884	239,951

Eastern Visayas	125	7,837	142,344
Cebu	105	6,363	121,346
Leyte	13	6,199	17,573
Southwestern Mindanao	61	5,577	56,879
Davao	32	2,004	27,810
Zamboanga del Sul	12	2,121	17,084
Northeastern Mindanao	50	9,910	82,560
Agusan	15	1,213	14,187
Lanao del Noete and del Sur	11	2,309	20,116
Misamis Occidental	8	1,468	5,542
Misamis Oriental	11	4,410	40,579

Table 5 Financing Program

Unit: million pesos

Land and resources improvements	4,671
Plant and other business construction	607
Machinery and equipment	3,430
Residential construction	750
Government public works	2,628
Investment in stocks	604
	12,693

Table 6 Investment Program for Manufacturing Industry

Unit: million pesos

Basic Metals and Metal products	1,736
Basic and other chemicals	457
Pulp and paper	216
Food proceeing	179
Textiles	179
Non-metallic minerals	185
Wood processing	110
Cottage Industries	90
Miscellaneous industries (foot wear apparels, furnitures, leather and others)	774
	3,925

Table 7 Comparison of Industrial Composition of the Philippines and Japan

Classification	Industrial Products	Percentage against total sales				
		Phil.	Japan			
		1959	1930	1940	1950	1960
Basic Industry	Chemical Products	11.8	10.2	11.7	13.2	9.4
	Petroleum and coal Products	6.9	0.6	0.7	1.4	2.4
	Basic Metal	1.7	5.7	15.9	13.8	14.9
	Sub Total	20.4	16.5	28.3	28.4	26.7
Processing Industry	Machinery	3.9	10.6	29.4	13.8	25.7
	Food-Stuffs	34.8	16.1	8.6	12.5	12.4
	Textiles	7.3	38.0	17.3	22.8	12.4
	Paper Products	2.6	2.9	2.3	4.0	3.8
	Rubber Goods	3.0	1.1	0.9	2.4	1.5
	Ceramic Products	3.0	2.9	2.6	3.5	3.5
	Lumber Products	5.3	2.8	3.6	3.7	3.5
	Metal Goods	4.6	3.9	4.6	2.7	3.9
	Others	15.1	5.2	2.4	6.2	6.6
	Sub Total	79.6	83.5	71.7	71.6	73.3
Grand Total : one hundred million Pesos		32	332	692	318	1,560

Note: 1. Figured out on the basis of 3,189 million including 220 million pesos of 1960.

2. Although there are differences in the contents of industrial products of the Philippines and Japan, they are grouped to show their reciprocacity.

Table 8 Comparison of sales by industries in percentage.

Classification	Industrial Produc ts	A	
		1930, 1940 average	1960
Basic Industry	Metal	9.1	13.2
	Sub total	9.1	13.2
Processing Industry	Machinery	16.1	21.8
	Paper products		1.2
	Textile	20.3	5.1
	Sub Total	36.4	28.6

Classification	Industrial Products	B	
		1930, 1940 average	1960
Basic Industry	Petroleum and Coal products	6.3	4.5
	Chemical products	0.8	2.4
	Sub total	7.1	6.9
Processing Industry	Foodstuffs	22.4	22.4
	Others	11.2	8.5
	Lumber products	2.1	1.8
	Rubber goods	2.0	1.5
	Sub total	38.4	34.9

A: Industries whose sales percentages against total of the Philippines are lower than those of Japan.

B: Industries whose sales percentages against total of the Philippines are higher than those of Japan.

Note: 1. This table shows the comparison of the composition ratio between the industrial sales of the Philippines and Japan.

2. The 1930, 1940 average is the comparison between the mathematical average of Japan's two years industrial sales percentage breakdown and the Philippines's in 1959. The 1960 average compares Japan's 1960 average to Philippines's 1959 average.

Table 9 Rate of increase in output

	Rate of Increase (%)		Composition Ratio (%)		Increase
	1960	1956	1956	1960	1960/1956
Total	100.0		100.0	100.0	146.8
Foodstuff	29.0		28.0	28.4	148.7
Beverage	4.4		7.0	6.0	125.2
Tobacco	2.0		7.1	5.0	104.8
Textile	9.9		5.5	7.3	192.9
Textile Goods	0.5		7.1	4.5	91.7
Lumber Goods	2.2		5.7	4.3	110.5
Furnitures	0.4		1.2	0.9	108.6
Pulp, Paper	4.4		2.2	3.1	208.0
Printed Matter	2.5		2.8	2.7	140.2
Leather Goods	0.8		0.3	0.5	225.8
Rubber Goods	6.2		0.8	3.0	533.4
Chemical Goods	11.8		11.8	11.8	146.5
Petrol Coal-Chemical					
Non-Ferrous Metal	2.0		3.5	2.9	122.5
Basic Metal	(1.8)		(1.3)	1.5	(170.4)
Metal Goods	8.7		3.8	5.8	221.9
Machinery	0.6		0.9	0.8	124.5
Electric Machineries	5.6		0.7	2.8	527.3
Traffic Goods	2.7		2.6	2.6	167.3
Miscellaneous	4.6		7.6	6.4	123.2

Table 10 Industrial output estimate equations of the Philippines

Unit: 1000 pesos

	y=Insustrial output t=1956	R^2	1963	1967	1973
Total	y = 292,143t + 2,114,245	0.9929	4,451,389	5,619,961	7,372,819
Foodstuff	y = 82,045t + 561,087	0.8987	1,217,447	1,545,627	2,037,897
Beverage	y = 11,567t + 155,432	0.9669	247,968	294,236	363,638
Tobacco			(222,569)	(238,080)	(368,641)
Textile	y = 29,074t + 128,660	0.8547	361,252	477,548	523,332
Textile Goods			(200,313)	(251,212)	(331,777)
Lumber Goods			(191,410)	(241,658)	(317,031)
Furnitures	y = 3,140t + 19,851	0.7565	44,971	57,531	76,371
Pulp, Paper	y = 14,457t + 31,326	0.8709	146,928	204,810	291,552
Printed Matter	y = 6,856t + 62,274	0.9865	117,122	144,546	185,682
Leather Goods	y = 2,250t + 4,348	0.7065	22,348	31,348	44,848
Rubber Goods	y = 21,370t + 7,229	0.9473	178,189	283,669	391,889
Chemical Goods	y = 37,287t + 249,689	0.9396	147,985	697,133	920,855
Petrol Coal-Chemical					

Non-Ferrous Metal	y = 5,979t + 76,725	0.8145	124,557	148,473	184,347
Basic Metal	y = 10,674t + 16,229	0.7724	101,621	133,643	208,361
Metal Goods	y = 27,506t + 56,542	0.9319	276,590	386,614	551,650
Machinery			(35,611)	(42,150)	(58,982)
Electric Machineries	y = 19,924t + 4,107	0.8466	163,499	243,195	362,739
Traffic Goods	y = 7,587t + 50,120	0.7587	110,816	141,154	186,686
Miscellaneous	y = 13,098t + 166,206	0.8794	270,990	323,332	401,970
Total			4,582,240	5,931,019	7,808,248

Note: Figures in ( ) are estimates based on the percentage breakdown of 1961.

Table 11 Estimated enterprises, employment and Industrial land for increased output in the year of 1963 - 1967

	0(1967-63)	Enter-prises	Employees	Industrial Land ($100m^2$)
Total	1,348;779	484	50,989	52,593
Foodstuff	328,180	95	8,841	16,596
Beverage	46,268	7	660	908
Tobacco	60,511			
Textile	116,296	51	6,065	5,732
Textile Goods	50,899	54	3,885	949
Lumber Goods	50,248	49	2,905	3,527
Furnitures	12,560	12	905	468
Pulp, Paper	57,828	16	1,804	3,060
Printed Matter	27,424	14	1,407	225
Leather Goods	9,000	6	471	279
Rubber Goods	105,480	24	5,319	2,438
Chemical Goods Petrol Coal-Chemical	149,480	15	3,307	7,927
Non-Ferrous Metal	23,916	11	1,242	1,558
Basic Metal	32,022	3	673	1,161
Metal Goods	110,024	69	5,673	3,316
Machinery	6,539	2	292	240
Electric Machineries	79,696	17	3,480	1,627
Traffic Goods	30,348	4	911	1,098
Miscellaneous	52,392	35	3,149	1,484

Table 12 List of proposed industries viewed from rate of increase in output and trend in facility-investment

Industry	Main Item	Enter-prise	Employ-ment	Output (1,000pesos)	Land needed ($100 m^2$)
Foodstuff	Dairy products	2	300	15,000	400
	Canned Fish, Veg.	2	400	5,000	200
	Flour	1	40	1,000	150
	Lard, Margarine	1	150	8,500	130
Chemical	Alcohol	1	35	1,000	170
	Liquid Gas	1	70	850	100
	Medical Goods	2	200	4,500	100
Pulp & Paper	Paper	2	200	5,000	700
	Cardboard	2	100	3,000	60
	Paper Common	2	100	2,000	140
Txtile	Cotton	1	500	6,000	350
	Clothing	2	200	3,000	60
Metal	Structure	2	300	2,500	80
	Canning	1	100	1,000	15
	Processing	1	80	2,500	50
Total		23	2,725	60,850	2,605

Table 13 LIMAY

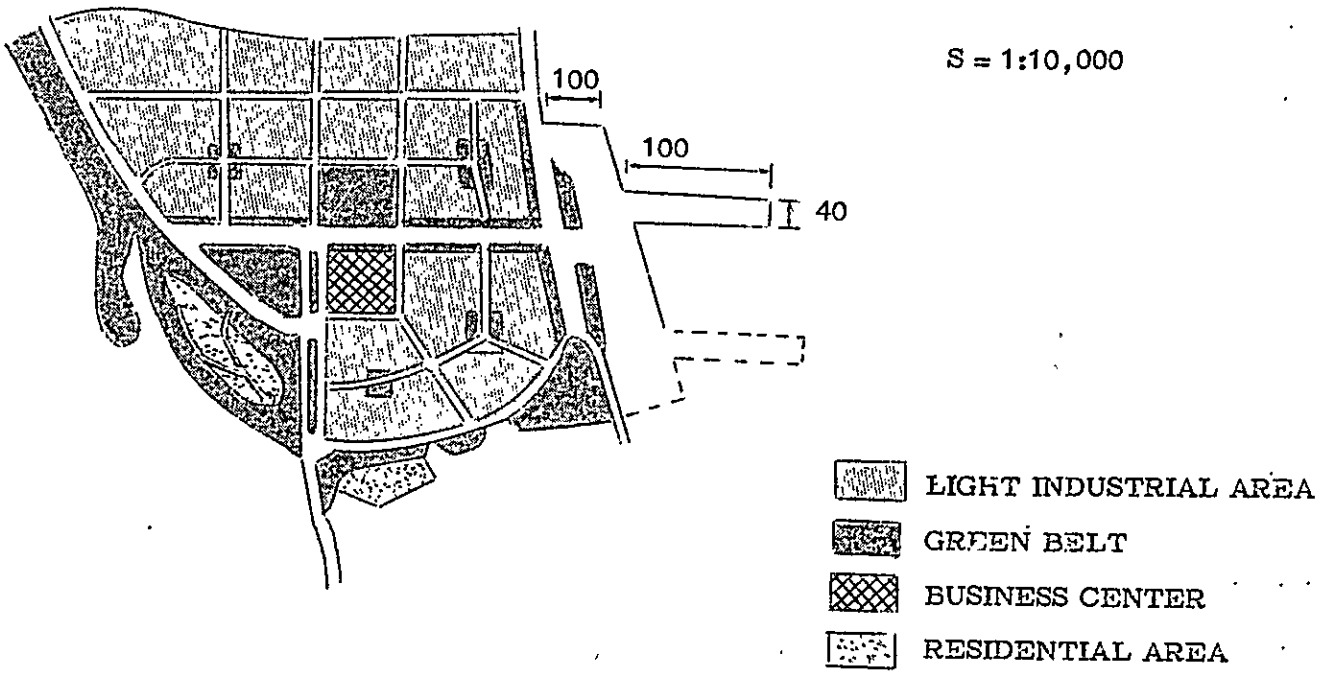


Table 144 ROSARIO

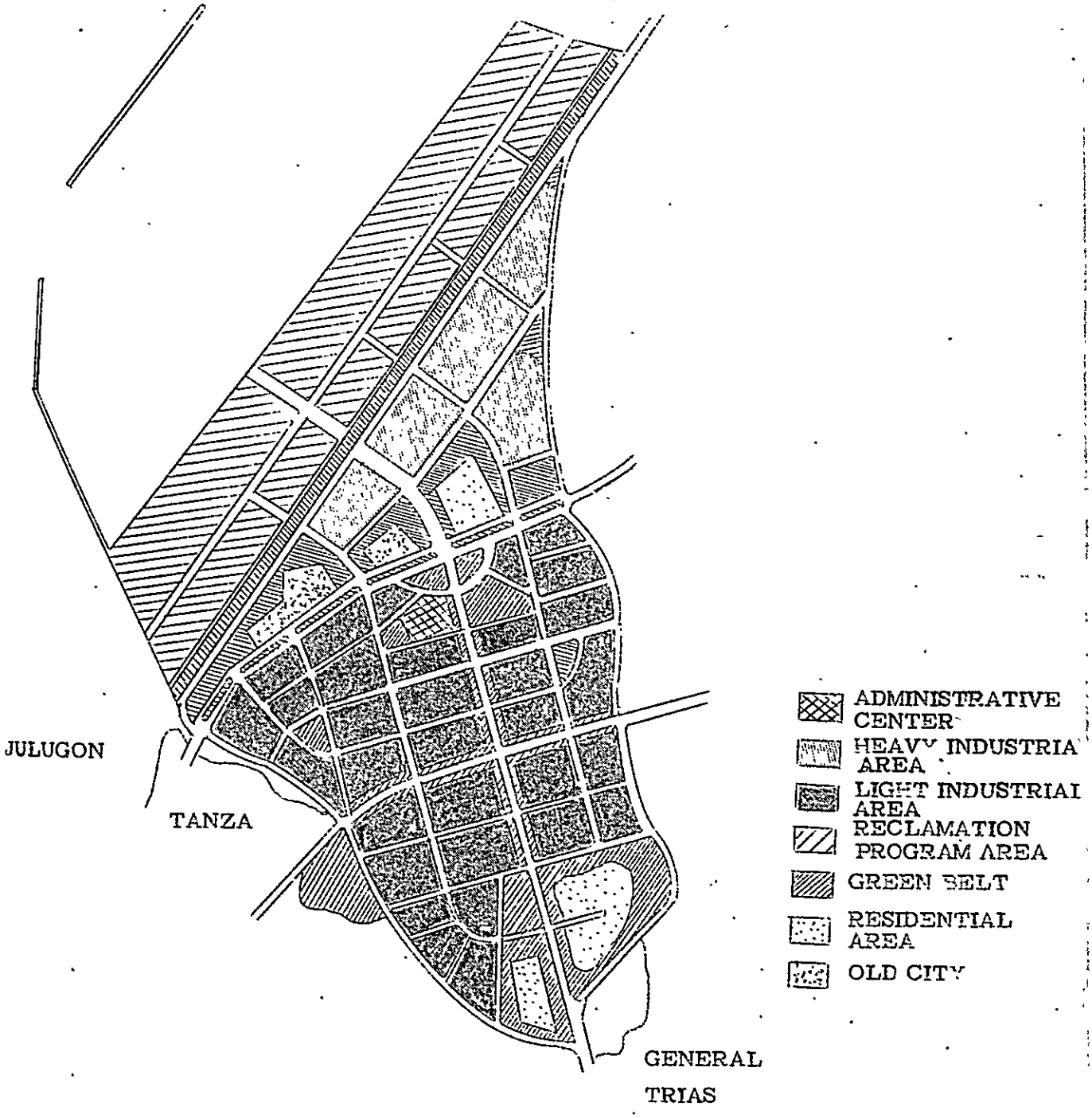


Table 15 ILIGAN