INDUSTRIALIZATION IN ARGENTINA

By

Luella N. Dambaugh

Dissertation submitted to the Faculty of the Graduate School of the University of Maryland in partial fulfillment of the requirements for the degree of Doctor of Philosophy

1947

UMI Number: DP70311

All rights reserved

INFORMATION TO ALL USERS
The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript
and there are missing pages, these will be noted. Also, if material had to be removed,
a note will indicate the deletion.

UMI DP70311

Published by ProQuest LLC (2015). Copyright in the Dissertation held by the Author.

Microform Edition © ProQuest LLC.
All rights reserved. This work is protected against
unauthorized copying under Title 17, United States Code

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

PREFACE

Argentina cherishes the desire of becoming a modern industrial nation. Every effort of the National Government is bent toward furthering the interests of the manufacturers and workers who are to play their part in the expanding industrial economy. In fact, as a result of the recent developments in manufacturing, coupled with the favorable balance of payments due largely to the excess of exports over imports during the last war, the economy of the Nation is in a state of flux. Certain Argentine leaders feel that manufacturing will supersede from now on the agricultural-pastoral economy as the major source of national income, and that there will be little opportunity for the permanent expansion of production of agricultural products for export. They foresee the necessity of encouraging domestic industries even to the extent of subsidizing them and shielding them behind high tariff walls. They are seeking markets for their cheap consumer goods which industry in an early stage of development is only capable of producing. Economic bases of exchange with Chile, Brazil and others of their neighbors, and even distant Spain have already been worked out. Severe competition in the international market will be encountered, to be sure, as the nations throw off the wartime shackles and settle down to peaceful living.

Argentina has many advantages favoring industrial development. The population is by no means large or dense, and since the Nation remained neutral during the Second World War, it is in a favorable position to receive immigrants, workers and inventors, who are interested in factory

14991

work, and who will be capable also of enlarging the domestic market.

Argentina now is the wealthiest nation in Latin America. It has capital to expend on equipment for transportation and industry. Large orders for new machinery and tools have been placed in United States, Great Britain and in Continental Countries. Plants are to be enlarged and new ones built.

There seems to be little doubt of the prospect of finding valuable mineral deposits in the Andean sections adjacent to Bolivia and Chile once detailed surveys can be carried out and the transportation net can be extended in order to convey the minerals more cheaply from the producing regions to the now-existing centers of industry, or to industrial nuclei to be developed in peripheral regions.

The excellent harbor formed by the Rfo de la Plata estuary is certainly conducive to buying and selling in world markets, both of which are necessary for a sound economy in an industrial nation.

Argentina has hydroelectric potentialities capable of supplying the entire nation when developed, and perhaps, large petroleum reserves that can be utilized when needed. Large tonnages of raw materials now exported may feed domestic industries in the future.

There is a darker side to the picture, however. Argentina's industrial outlook is confronted with certain limitations already apparent and accentuated during the last war. An absence of metallurgical coal, and an insufficient exploitation of ferrous and alloying minerals have precluded, up to the present time, the full extent of the development of a heavy iron and steel industry so essential to the industrial advancement of the Nation. The fuel situation as a whole presents a grave problem. Even petroleum

production falls short of meeting the domestic demand and must be supplemented with imports. Practically all of the coal consumed is imported. Many substitute fuels are used.

The transportation net, that focuses on Buenos Aires, is the best in Latin America. From the point of view of using the available, and perhaps potential natural resources of the country most economically, it is, however, inadequate.

There is, also, the problem which faces all the nations of the Americas, namely, the declining birth rate and its ensuing consequences of a diminution in the rate of natural increase, a stationary and finally a declining population with an ultimate shortage of labor to man the Nation's industries.

Hope that Argentina may realize her ambition to further industrialize and thus raise the standard of living of the Argentine people would seem to lie in the ability of the Nation to formulate and to carry out a scientific program designed to include all aspects of the Nation's economy, and especially, to take the necessary measures to increase the total population.

This study will attempt to shed light upon the part played by manufacturing in the economy of the Nation. A discussion of the geographic location of manufacturing in Argentina, the status in 1941, the changes that have since taken place, and the direction industrialization is likely to take in the future under the influence of geographic conditions and economic forces will reveal to the reader the dynamic nature of Argentina's industry.

This over-all picture of manufacturing will furnish background for a somewhat detailed analysis of that industry which is considered by modern

industrial nations to be essential, and therefore basic, to their progress, namely, iron and steel. And lastly, certain conclusions will be drawn from this geographic study which will enable one to anticipate, in a measure, the future of industrialization in Argentina.

The year 1941 was chosen to portray the picture of manufacturing in Argentina. Several reasons for this choice may be mentioned: 1.) 1941, the last year of a complete nation-wide industrial census, probably gives the truest picture of manufacturing since it confines itself to industries having 5 or more workers and thus eliminates the small shop, 2.) this was the first year for which an official, detailed calculation of the national income has been prepared. 3.) the most detailed information relevant to mining activities in the country has been published since 1940, and 4.) the full impact of the last war on industry was not felt to any great extent in Argentina at that time because the war did not take on global proportions until December 1941 and the Nation had already begun to take measures designed to counteract the adverse effects of the crisis on their economy.

Frequently, statistical data have been traced several years before- and after 1941. Justification for so doing lies in the fact that: 1.) it was sometimes necessary to cite historical data in order to portray the dynamic nature of Argentine industrialization, 2.) the changes taking place in the economic structure of the Nation as a result of World War II could be presented best through statistical estimates, and 3.) to attempt to foresee the future of the manufactural activity in Argentina, it was expedient to employ data from 1941 up to and including the most recent estimates.

The obligations incurred in the preparation of this study are extensive. The available materials were widely scattered as to source and as to library. Much physical effort was expended in assembling, organizing and interpolating those data collected.

The writer is grateful to Professor O. E. Baker who suggested the topic and offered valuable suggestions at various stages. Appreciation is also due Professor William Van Royan for criticisms and suggestions. I am particularly indebted to Professor Raymond E. Crist for his consultation and guidance, and for critically reading the manuscript.

The Fellowship granted by the University of Maryland has enabled me to use the library facilities in Washington, D.C. In this connection, I wish to extend my gratitude to the numerous individuals in the Library of Congress for their courtesy and helpfulness in allocating materials. I wish especially to thank Miss Mary Ann Martinik, Reference Assistant, Government Publications Reading Room, Library of Congress. I am also grateful to Miss Marian Forero, Reference Librarian and to Mr. Carlos Guillén, Assistant, Circulating Department, Columbus Memorial Library, Pan American Union for their splendid cooperation in placing materials at my disposal.

Acknowledgement for the granting of interviews is due Mr. Allyn C. Loosley, In Charge of Latin American Division, United States Tariff Commission, Mr. Guy Castle, Specialist in Argentine Tariff, Office of International Trade, American Republic Division, United States Department of Commerce, Dr. Carl C. Taylor, Head Agricultural Economist, Bureau of Agriculture Economics, United States Department of Agriculture, and Mr. John F. Hannassey, Division of Economic and Financial Information, Pan American Union.

I am indebted also to my husband for help in preparation of the illustrations and proofreading, and above all, for his patience and encouragement.

L.N.D.

Washington, D.C.
June 1947

TABLE OF CONTENTS

		Page
PREFACE		ii
LIST OF FIGURES		ix
LIST OF TABLES		x
Chapter		
I.	ROLE OF MANUFACTURING IN ARGENTINA	1
II.	GEOGRAPHIC RESOURCES AND ECONOMIC FACTORS CONDUCIVE TO IRON AND STEEL MANUFACTURING IN ARGENTINA	69
III.	RATIONALIZATION OF THE ARGENTINE IRON AND STEEL INDUSTRY	146
IV.	CONCLUSIONS	262
APPENDIX		273
SELECTED BIBLIOGRAPHY		284

LIST OF FIGURES

Figure		Page
1.	Value and Physical Volume of Industrial Production in Argentina	8
2.	Physical Value of Argentine Exports	9
3.	Physical Volume of Argentine Imports, Per Capita	9
4.	Geographic Concentration of Manufacturing in Argentina, 1941	26
5.	Iron and Steel Manufacturing in Argentina, 1941	95
6.	Argentine Manufactural Exports, 1937 to 1943	142
7.	Consumption of Fuels in Argentina, In Equivalent Petroleum Tons	153
8.	Consumption of Fuels in Argentina, By Types of Fuel	155
9.	Consumption of Fuels in Argentina, By Origin	162
10.	Location of Fuel and Power Resources in Argentina	164
11.	Argentine Production of Crude Petroleum, 1915 to 1942, Fiscal and Private	169
12.	Argentine Consumption of Crude Petroleum, 1926 to 1942, By Origin	173
13.	Consumption of Wood and Charcoal in Argentina, 1922 to 1941	177
14.	Argentine Coal Imports, 1910 to 1941	188
15.	Location of Mineral Resources for Iron and Steel Manufacturing in Argentina	217
16.	Tungsten Concentrates	254
17.	Zinc Concentrates	254

LIST OF TABLES

Table		Page
I.	National Income of Argentina, For the Year 1941	3
II.	Rough Estimate of the Value of Production in Argentina	5
III.	Summary of Manufacturing in Argentina, For Each Census Year	12
IV.	Classification of Industrial Establishments in Argentina, According to the Year of Their Founding . .	13
V.	Indexes of Occupied Workers and Salaries Paid in Argentina, 1938 to 1945	15
VI.	Summary of Manufacturing in Argentina, By Industrial Groups, For the Year 1941	18
VII.	Geographic Concentration of Manufacturing in Argentina, 1941	25
VIII.	Foreign Trade of Argentina, 1941	30
IX.	Value of Argentine Exports, By Major Groups, 1937 to 1944	32
X.	Percentage of Total Value of Raw Materials Used in Each Argentine Manufacturing Group, By Origin, 1941	33
XI.	Summary of Iron and Steel Manufacturing in Argentina, For Each Census Year	77
XII.	Geographic Concentration of Iron and Steel Mills in Argentina, 1941	93
XIII.	National Consumption of Iron and Steel Products in Argentina, For the Years 1937, 1939, 1941 and 1942 . .	97
XIV.	Tonnage of Ferrous Raw Materials and Ferrous Scrap, Used in Each Subgroup of Iron and Steel Manufacturing in Argentina, 1941	133
XV.	Argentine Exports of Iron and Its Manufactures, For the Years 1937 to 1943	140

Table		Page
XVI.	National Consumption of Fuels and Lubricants in Argentina, For the Years 1937 to 1942	149
XVII.	Consumption of Fuels in Argentina, By Types of Fuel	151
XVIII.	Consumption of Residues for Fuel in Argentina, 1941 . .	152
XIX.	Consumption of Fuels and Lubricants, and Purchased Electric Current in Argentina, 1941, By Industrial Groups	157
XX.	Consumption of Fuel Types in Argentina, For the Years 1922 and 1941, By Origin	160
XXI.	Estimated Forest Area of Argentina, By Province and Territory	175
XXII.	Production of Solid Fuels in Argentina, For the Years 1941 to 1943	182
XXIII.	Production of Electric Current in Argentina	199
XXIV.	Consumption of Fuels by Power Plants in Argentina, For the Years 1941 and 1942	200
XXV.	Argentine Hydraulics, 1941	203
XXVI.	Hydraulic Resources of Argentina	206
XXVII.	Argentine Mineral Resources for Iron and Steel Manufacturing, 1941, By Tonnage and Value	257

Appendix

1.	Summary of Manufacturing in Argentina, By Industrial Groups, For Each Census Year	273
2.	Percentage Distribution of Employees, Value of Production, and Value Added by Manufacture, in Argentina, By Industrial Groups, For Each Census Year	274
3.	Distribution of the Number of Establishments, Wage Earners, and Value of Production, In Each Category of Production in Argentina, By Industrial Groups, 1941	275
4.	Extent of Concentration in 14 Industrial Groups in Argentina, 1940	276

Appendix Page

5. Argentine Production, Importation and Exportation of Typical Raw Materials in 1939 277

6. Distribution of Number of Establishments, Number of Workers, and Value of Production, In Each Subgroup of Iron and Steel Manufacturing, in Argentina, 1941 278

7. Summary of Iron and Steel Manufacturing in Argentina, By Subgroups, For the Year 1941 279

8. Argentine Imports of Iron and Its Manufactures, 1937 to 1943 280

9. Summary of Iron and Steel Trade of Argentina, By Major Commodity Groups, Country of Origin and Destination, For the Year 1941 281

10. Consumption of Fuels and Lubricants for Motive Force and Other Uses in Argentine Manufactural Industrial, 1941, By Types of Fuel 282

11. Consumption and Costs of Fuel By Argentine Railroads, 1938 to 1943, By Types of Fuel 283

CHAPTER I

ROLE OF MANUFACTURING IN ARGENTINA

The importance of manufacturing in the Argentine economy has long been overshadowed by the development of agricultural-pastoral activities, the products of which reached world markets and in turn reflected world economic conditions. Argentina, however, is one of the leading industrial nations in Latin America, having come to the forefront largely since 1931, at which time the Nation was compelled by external forces to take a serious interest in trying to supply the necessary manufactured products to the home market. Since these efforts proved fruitful, progress along lines designed primarily to raise the standard of living of her people was encouraged. Industrial expansion has been very rapid, especially in the last decade. The leaders of the Nation have the vision, backed by an inspired laboring populace, to further develop those phases of manufacturing which give promise of a profitable future.

This chapter will discuss the geographic structure of the manufacturing industry including the place of manufacturing in the economy of the Nation, the nature of the manufacturing in Argentina, the scale of operations and the geographic resources for manufacturing; and second, the dynamic character of Argentine manufacturing.

Geographic Structure of Argentine Manufacturing

The manufacturing industry of Argentina is indicative of certain outstanding geographic characteristics. These are: marked concentration of manufacturing in Greater Buenos Aires, rapid expansion since 1931, emphasis chiefly on consumer goods for an expanding home market, an increasing share of the total exports during the last few years, dependence on foreign sources for large tonnages of fuel and certain raw materials,

increased governmental intervention in the form of high tariff duties and certain regulatory measures, and lastly, a superseded position as compared to the agricultural-pastoral industry in its contribution to the national income.

Place of manufacturing in the economy of the Nation.- A look at the gross national income of Argentina for the year 1941, the first time such data have been published, is a necessary introduction.

The purpose of calculating the national income was to determine the wealth created by the country's economic activities over a period of time. Such wealth may be determined in terms of production and of consumption. In production the part of each activity to be considered as income is expressed as salaries and wages, amortizations and profits. In consumption, income is represented by the value of goods consumed by private, industrial and official consumers, to which must be added savings, capital investments, and other items not consumed. These two totals of income, production and consumption, should theoretically be the same.[1]

In this study of the part of the national income contributed by the manufactural industry in 1941 the country's work activities have been grouped under three headings: production, distribution and services (Table I). The first includes all activities which create or transform marketable goods, both extractive and manufacturing activities; and second includes transport, communications, and wholesale and retail trading, in brief, all activities which distribute and convey goods without changing the form or shape of the goods they handle and the third group covers government finance, insurance, and the liberal professions, all

---

[1] "Argentina's National Income," Rev. of the River Plate, XCVII, No. 2764 (December 1, 1944), 14-16.

TABLE I
NATIONAL INCOME OF ARGENTINA
For the Year 1941*

Item	T. Pesos
PRODUCTION	
Manufacturing	1.769.718
Agriculture	1.453.814
Pastoral	1.256.300
Public Utilities	382.921
Forestry	121.185
Building	105.650
Gross Income	5.153.486
DISTRIBUTION	
Trading: wholesale & retail	2.332.783
Transportation	502.068
Communications	76.409
Gross Income	2.911.260
SERVICES	
Government	1.689.200
Urban real estate	702.895
Finance	167.326
Liberal professions	164.436
Gross Income	2.723.857
GROSS NATIONAL INCOME	10.788.603

*"Argentina's National Income," The Review of the River Plate, XCVII, No. 2764 (December 1, 1944), 15-16.

Note: This is the first time any such study has been undertaken, and as the statistical organization of the country is far from perfect, the figures are necessarily incomplete and not entirely free from error.

That the margin of error cannot be great is borne out by the fact that 60 per cent of the material used in the calculations was official data. The methods followed were those used by North American, British, French and German statisticians.

activities in which no material goods are produced, but in which income is created in exchange for services, private or official.

The gross income of the country is the total value of the wealth produced by work activities, and the amount necessary for replacement of losses through wear and tear, without which the activity of the country would be unable to continue.[2]

Of the three major sources of gross national income, production, distribution and services, the production activities contributed approximately 50 per cent by value, in 1941. Among the production activities manufacturing ranked first with 1.769.700.000 pesos.[3] This amounted to 34 per cent of the gross income from the production activities and 16 per cent of the gross national income from all sources. Agricultural pursuits ranked second and pastoral activities third in their contribution to the gross income from the production activities.

A picture of the interchange of agricultural-pastoral work with that of industry as contributors to the national income may be gleaned from Table II.

The gross value of industrial production almost equalled the total of agricultural-pastoral production combined in 1941, and was more than twice that of the agricultural-pastoral gross total for the years 1942 and 1943. The following trends are apparent: 1.) a decrease in

---

[2] It is the net income that is distributed among and consumed by the population. It has not been possible to determine the net income, but accepting the proportion used in the United States for the years 1934 and 1935, it is arrived at by deducting 12 from the gross income for 1941 of 10.789.000.000 pesos, giving a net income for 1941 of 9.494.000.000 pesos. Rev. of the River Plate, op. cit.

[3] According to the Federal Reserve Bulletin (August, 1944) the conversion of internal prices and values to United States dollars is as follows: 1 peso = in 1914, $0.4312; 1935, $0.3266; 1936, $0.3314; 1937, $0.3296; 1938, $0.3260; 1939, $0.3085; and 1940-1944, $0.2977.

TABLE II

ROUGH ESTIMATE OF THE VALUE OF PRODUCTION IN ARGENTINA*
(Millions of Pesos)

Year	Gross Value of Production				Net Value Created By Production	
	Agricultural & Pastoral			Industrial	Agricultural & Pastoral**	Industrial***
	Agricultural	Pastoral	Total			
1935	1850	1050	2900	3330	2150	1300
1937	2300	1390	3635	4475	2850	1550
1939	1800	1300	3100	4630	2400	1750
1940	1550	1350	2900	5050	2200	1850
1941	1800	1500	3350	6100	2500	2100
1942	1750	1750	3500	7000	2700	2650
1943	1600	1750	3350	7800	2600	2700

*Banco Central de la República Argentina. Annual Report. Ninth Financial Period. 1943 (Buenos Aires: 1944), p. 4.

**Gross value at the place of production less value of materials consumed in the process of production.

***Value of manufactured articles less cost of raw materials, packing, fuel and power purchased

agricultural production of 13.5 per cent from 1935 to 1943, or from 1.850.000.000 pesos to 1.600.000.000 pesos; 2.) an increase in pastoral production of 40 per cent, from 1.050.000.000 pesos in 1935 to 1.750.000.000 pesos in 1943; 3.) an increase of 13.4 per cent for agricultural and pastoral production taken together from 2.900.000.000 pesos in 1935 to 3.350.000.000 pesos in 1943; and 4.) an increase of 57.3 per cent in industrial production, from 3.330.000.000 pesos in 1935 to 7.800.000.000 pesos in 1943. "This figure is dilated by the recent rise in prices, but if this factor be eliminated there remains an increase of approximately 55 per cent in the physical volume of industrial production between 1935 and 1942."[4]

The net value created by production showed an interesting contrast between the agricultural-pastoral and industrial activities. There was likewise a change in the relative position of agricultural-pastoral production with that of industrial production between 1935 and 1943. The agricultural-pastoral production increased by only 17.3 per cent, while that of industrial production increased by 51.6 per cent between these same years. The net industrial production almost equalled that of the agricultural-pastoral industries combined in 1941 and 1942, but more than equalled it in 1943 (Table II). The Central Bank, however, throws out the caution that, ".... for all that these figures indicate a sharp change in the Argentine economy and in the composition of the income of the community, unjustified conclusions should be avoided."[5] Rising prices, especially since 1940, were a part of the increase in the value of

---

[4]Banco Central de la República Argentina, Annual Report. Eighth Financial Period, 1942 (Buenos Aires: 1943), p. 4.

[5]Banco Central de la República Argentina, op. cit.

industrial production. Markets for grain were restricted, and foreign manufactures were hard to get, and thus the manufacturing industries were abnormally stimulated.

Some conclusions as to what has happened to the national economy in Argentina may be deduced from a careful examination of Figs. 1, 2 and 3.[6] It is to be noted that: 1.) the increase in industrial production, both volume and value, was well marked during the early years of the period, 1935 to 1942, and has continued unabated during the war years, 2.) the trend in physical volume of exports has been downward, especially since 1930, and 3.) the trend in physical volume of imports per capita has also been downward since that year.

The former reliance of Argentina on the sale of export commodities to maintain her economic livelihood, that is, to sell exports in order to purchase imports, is no longer the outstanding conditioning factor in the national economy. A change of profound significance has been taking place, stimulated by recent wartime conditions. Forces within the country have gained ground and manufactural pursuits are now contributing the largest segment in the national income.

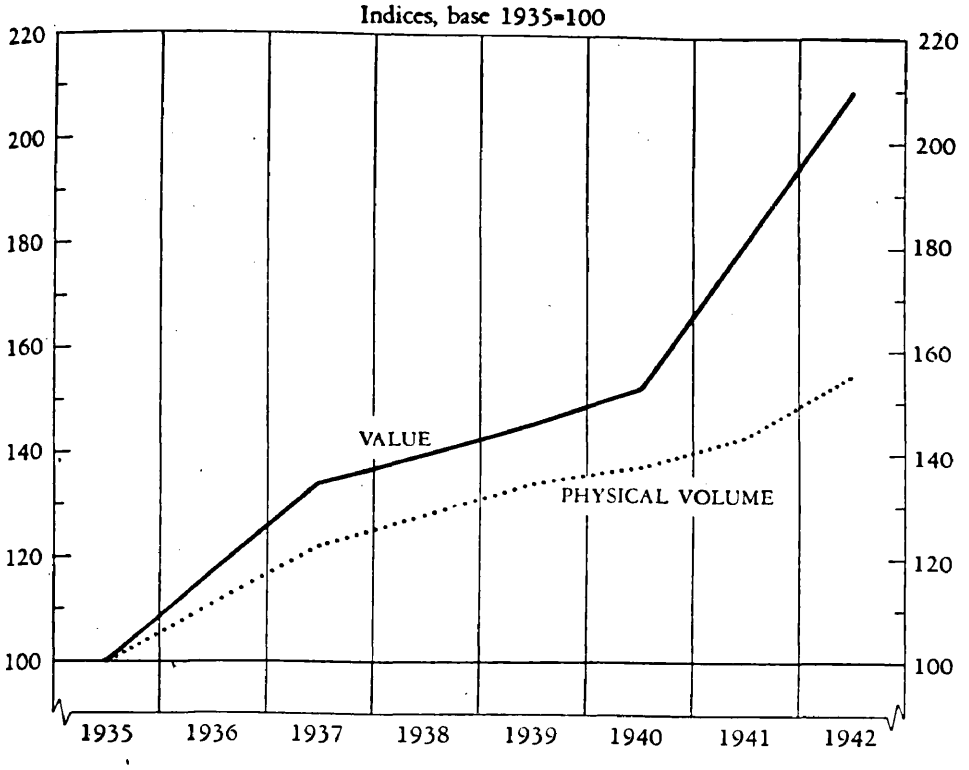
---

[6] In arriving at the physical volume of industrial production an estimate was made by the Central Bank on the basis of the industrial employment index published by the National Statistical Department. This index, after being compared with an index of the volume of production compiled on the basis of data obtained in 1935, 1937 and 1939 industrial censuses, reflected the variations in the physical volume of manufactural goods.

The estimate of the value of production in 1942 was based on the 1940 figure furnished by the National Statistical Department. The increase in the employment index between 1940 and 1942 was applied to that value and the figure obtained was adjusted by means of a price index for the period.

The method of arriving at the indexes for Figs. 2 and 3 is self-explained. Banco Central de la República Argentina, op. cit., p. 99.

Figure 1
Value and physical volume of industrial production



Source: Banco Central de la República Argentina. Annual Report. Eighth Financial Period, 1942 (Buenos Aires: 1943), p. 2.

However, the Central Bank points out:

> The purchasing power derived from agricultural and pastoral production still has a predominant influence on industry and on the other activities of the country. Furthermore, the working of all existent industries, outside those that process agricultural and pastoral products and except for a considerable part of the fuel consumed, is dependent fundamentally on the importation of essential materials from abroad.....[7]

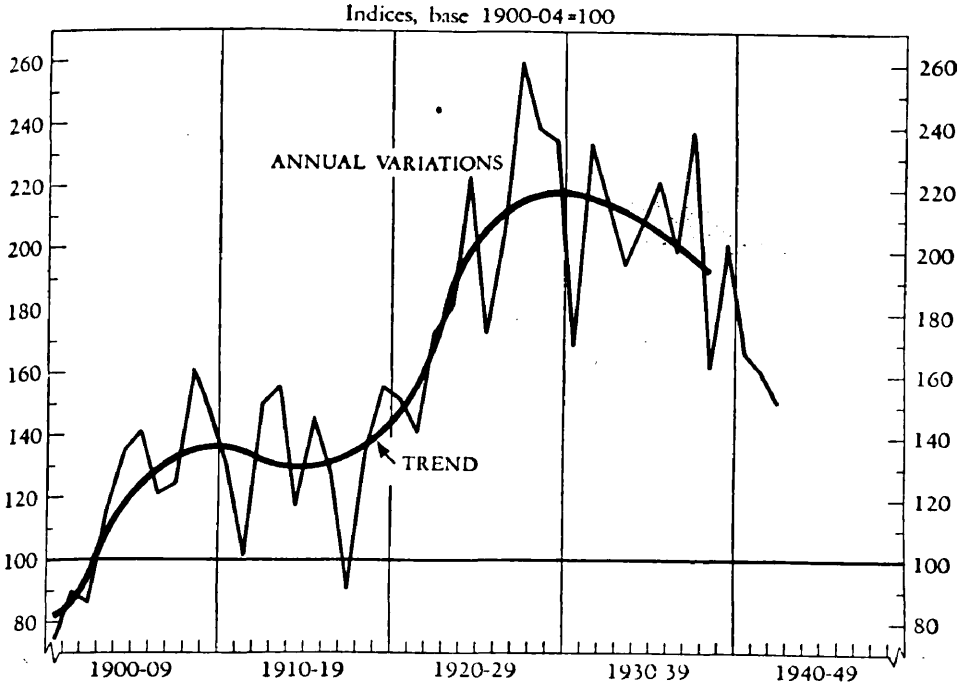
This will be considered further in a later Chapter.

Nature of manufacturing in Argentina.- The geographic character of the manufactural industry in Argentina can best be ascertained through a detailed analysis of pertinent statistics. Using the generally accepted

---

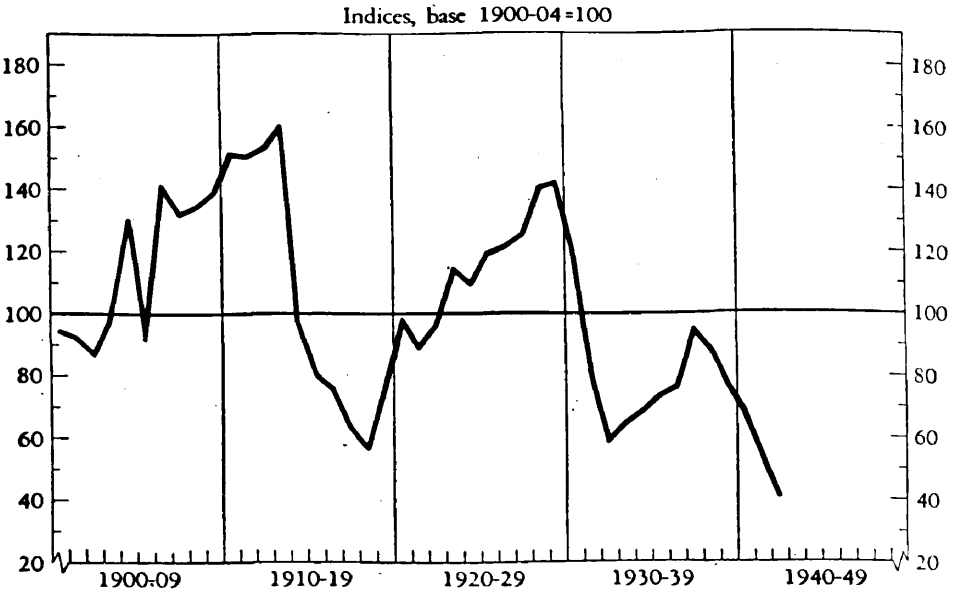
[7] Banco Central de la República Argentina, op. cit.

Figure 2
Physical volume of exports
Indices, base 1900-04=100



Source: Banco Central de la República Argentina, op. cit., p. 3.

Figure 3
Physical volume of imports per capita
Indices, base 1900-04=100



Source: Banco Central de la República Argentina, supra, p. 5.

definition of manufacturing, the adaptation of raw materials or the products of previous processes for the next stage of processing or for the final consumer,[6] and keeping in mind that modern industry confines itself to factory location, it has been necessary to make appropriate compilations from Estadística Industrial de 1941 and Estadística Industrial de la República Argentina correspondiente al año 1942. Only those industries employing 5 or more workers[9] were included. It is hoped that the workshop or household industries utilizing little or no power machinery are thus eliminated. Certain industrial groups had to be omitted from the totals. Fuel and power are wholly consumed in the process of manufacture and consequently, like most raw materials, do not enter into the weight of the manufactured products, thus the categories of petroleum, coal and derivatives and electric light and power were excluded. Construction enterprises that are service industries, and mines and quarries that are extractive industries, were likewise deleted.

It should be mentioned again that 1941 was the last year for which detailed census reports on all aspects of industry have been published. Limited types of data are available in mimeographed form for only a few of the criteria selected to portray the truth about Argentine manufacturing.

While there is no one criterion that is considered best as a basis for evaluating the magnitude of the various components and trends of manufactural production, there are several criteria, which taken

---

[6] National Resources Planning Board, Industrial Location and National Resources, December, 1942 (Washington, D.C.: Government Printing Office, 1943), p. 297.

[9] Industries occupying 5 or more workers amounted to more than 93 per cent of the value of production, raw materials used, fuels and lubricants consumed, electric current purchased for motive force and motive power installed.

together, give a fairly good résumé of the status of the manufactural industry[10] in 1941, and permit one to make comparisons between the various years for which census data are reported. Table III summarizes such data as pertain to the manufactural industries with 5 or more workers, for the years 1935, 1937, 1939, 1941 and 1942.

First of all one may note that a substantial increase has taken place in each of the 12 categories enumerated from 1935 to 1941. The increase continued on into 1942.

There were 16.685 manufactural establishments[11] in 1941, an increase of 2.232 over 1939, 3.706 over 1937, and 5.584 over 1935. The total increase of 1941 over 1935 amounted to 32.8 per cent. There was an additional increment of 970 establishments reported for 1942, making a total number of establishments for that year of 17.655.

The increase in the number of manufacturing enterprises was most marked for the years 1939 and 1941 due in large measure to the internal reaction in Argentina superinduced by World War II. In 1941, two-fifths of all establishments registered were reported as having been founded after 1931; about one-third were founded between 1921 and 1930; and the remainder were in operation before 1921 (Table IV). No data are available that give the date of founding of the establishments with 5 or more workers, but if there were, no doubt the figures would show a larger fraction of such establishments were founded recently, since modern industry dates back only about two decades.

The number of employees (Table III), which includes salaried workers

---

[10] A manufacturing industry is a homogeneous group of enterprises which are related to each other as to common raw materials, common technology, or common market.

[11] A manufactural establishment signifies a single plant or factory.

TABLE III

SUMMARY OF MANUFACTURING IN ARGENTINA
For Each Census Year*

	1935	1937	1939	1941	1942
No. of establishments	11.101	12.979	14.453	16.685	17.655
Total employees	404.188	490.341	533.933	645.026	703.482
Salaried workers (empleados)	39.242	45.458	51.859	60.815	66.345
Wage earners (obreros)	364.946	444.883	482.134	582.211	637.137
Primary motors, h.p.	355.058	402.825	477.058	499.903	523.965
Motors operated on bought current, h.p.	427.536	519.546	601.635	693.140	644.209
	Thousands of Pesos				
Wages & salaries	574.625	725.429	818.255	950.986	1.092.928
Raw materials used	1.940.525	2.360.158	2.483.015	3.217.473	3.945.203
Fuels & lubricants used	42.501	57.418	66.721	109.594	145.652
Electric current purchased	28.338	32.631	32.762	51.153	59.789
Value of production	2.629.796	3.595.054	3.858.428	4.873.696	5.972.716
Value added by manufacture	918.432	1.124.842	1.272.050	1.495.476	1.822.072

*República Argentina. Ministerio de Hacienda. Dirección General de Estadística y Censos de la Nación. Estadística Industrial de la República Argentina, año 1942 (Buenos Aires: 18 de Julio de 1945), pp. 29-31.

Note: Manufacturing includes only establishments employing 5 or more workers, and excludes these industrial groups: petroleum and its products, electric-power plants, construction enterprises, and mines and quarries.

TABLE IV

CLASSIFICATION OF INDUSTRIAL ESTABLISHMENTS IN ARGENTINA, ACCORDING TO THE YEAR OF THEIR FOUNDING*

Year of Founding	Number	Per cent
To 1850	16	0.0
1851 to 1870	150	0.3
1871 to 1890	1.184	2.0
1891 to 1900	1.372	2.4
1901 to 1910	3.736	6.4
1911 to 1920	7.726	13.3
1921 to 1925	6.770	11.7
1926 to 1930	10.293	17.7
1931 to 1935	11.562	19.9
1936 to 1941	11.876	20.5
Undetermined	3.331	5.7
Total for Argentina	57.976	100.0

*República Argentina. Ministerio de Hacienda. Dirección General de Estadística y Censos de la Nación. Estadística Industrial de 1941 (Buenos Aires: 1944), p. 25.

Note: Industrial establishments includes all establishments and all industrial groups.

(empleados) and wage earners (obreros), totaled 643.026 persons in 1941, and 703.482 for 1942. This category showed an addition of 109.033 workers over 1939, 152.685 over 1937, and 238.838 over 1935, or a growth from 1935 to 1941 of 37.2 per cent in the total number of employed persons.

Table V showing the indexes of occupied workers and salaries paid also mirrors the increasing size of the labor force employed in industry. Using 1937 as 100 it may be noted that there was a continuous increase in the index of workers employed from that year to 1945, the last year for which data are available, when it was 132.5.

The number of occupied workers serves as an indicator of changes in the manufactural activity, but it should be used only in conjunction with other measures because it ignores differences in the number of hours worked. It may under-state the over-all size of plants in industries that are highly mechanized or where value added is relatively low and may under-state the over-all size of the unit in industries that have a high proportion of labor costs.

The sums paid in wages and salaries to all employees between 1935 and 1941 makes an interesting comparison (Table III). The total money wage-bill[12] for 1941 was 951.000.000 pesos, or an increase of 39.4 per cent over 1935. The total wage bill was 1.093.000.000 pesos in 1942. Refer to Table V again for the indexes of salaries paid.

All the raw materials used in 1941 amounted to 3.217.000.000 pesos, which was an increase of 49.0 per cent over 1935, while that of fuels and lubricants consumed was almost 110.000.000 pesos, showing a growth of 61.2 per cent from 1935 to 1941 (Table III).

---

[12]The money wage-bill means the total amount paid in wages in a period of time. J. E. Meade and C. I. Hitch. An Introduction to Economic Analysis and Policy (New York: Oxford University Press, 1942), p. 69.

TABLE V

INDEXES OF OCCUPIED WORKERS AND SALARIES PAID IN ARGENTINA 1938 to 1945*

Year	Occupied Workers	Salaries Paid
Index base: 1937 = 100		
1938	104.3	104.5
1939	108.5	110.9
1940	111.1	112.8
1941	117.0	123.0
1942	123.6	138.8
1943	126.1	150.6
1944	131.1	169.7
Jan. 1946	131.6	213.8
Feb. 1946	132.6	214.3

*Banco Central de la República Argentina. Suplemento Estadística de la Revista Económica. Nos. 78, 90, 102, and 105, 1944 - 1946, p. 11.

Note: The wage earner index is computed by dividing the number of wage earners (average for the year) employed in manufacturing establishments in 1937 into the average number for each census year and multiplying by 100.

The value of production (productos elaborados), another criterion[13] for judging the magnitude of industrial production, totaled 4.674.000.000 pesos in 1941, 3.658.000.000 for 1939, 3.595.000.000 for 1937, and 2.630.000.000 for 1935. There was a percentage increase of 46.0 from 1935 to 1941.

Perhaps the best criterion for evaluating the relative importance of the production and growth in manufacturing industries is the value added by manufacture[14] (valor agregado por la industria). This is because manufacturing is a transformation of raw materials, and industries should be evaluated not by the quantity or value of the products leaving the factory, but by the addition to the utility or to the money value of the materials entering the factories. In 1941 the value added by manufacture for Argentine manufacturing industry as a whole totaled 1.495.000.000 pesos, with 1.272.000.000 in 1939, 1.125.000.000 in 1937, and 918.000.000 in 1935. The 1941 figure was a percentage augmentation of 50.4 per cent over that for 1935. There was also an increment in value added from 1941 to 1942. The value added in 1942 amounted to 1.822.000.000 pesos.

In comparing manufacturing industries with one another, the relation between value of finished products and cost of materials should be kept in

---

[13]Value of products - selling values at factory or plant of all commodities produced during the Census year. This is not a satisfactory measure of the importance of an industry because only a part of this value is actually created within the industry. Another part is contributed by the value of materials used. The aggregate for cost of materials and value of products includes large amounts of duplication due to the use of the products of some industries as materials for others. 16 Census of the United States: 1940. Manufactures, 1939 (Washington, D.C.: 1942), I, p. 5.

[14]The value added by manufacture is the increase in the total value of commodities in existence as represented by the difference between the cost of materials consumed and the value of the products made from them. The result is the increase in utility that has resulted from manufacturing operations.

The value added by manufacture is obtained by subtracting from the cost of products manufactured the sum of the values corresponding to: raw materials used, fuels and lubricants consumed, electric energy purchased, and some spent on wages, salaries, fees, rents, amortizations, etc. Estadística Industrial de 1941, op. cit., p. 15.

mind. The products of one industry may be valued at the same amount as those of another, but in one case, in which low-cost materials are used and much labor is expended on them, several times as much value may be added to the materials as in the other industry, where the materials are expensive and only a small amount of labor is required to process them. Where the processes are simple little value is added to the raw materials and the number of workers is small. It is axiomatic that the industry that adds the greater amount of value is of the greatest economic importance.

Let us now examine the industrial groups for Argentina as of the year 1941 (Table VI). If one were to rank the groups of manufactural industries according to each of the criteria given (columns 1 to 6), and then make a composite observation of how each industrial group compared with the others, this is what he would discover: that foodstuffs held first place. Textiles ranked second, with the others in descending order: machinery, metals, forests, chemicals, printing, leather, ceramics, paper, and with rubber at the lowest rank.

Considering the ratio of the value added by manufacture to the value of production (column 7) there is a different conclusion to draw. Printing ranked first, and machinery second. In descending order were: forests, ceramics, metals, and so on, but with foods at the bottom of the list.

It may be noted further that the rank of the manufacturing groups on the basis of the value of production differs from that of the value added by manufacture.[15] Moreover, the ratio of value added to value of production in Argentine manufacturing industry for 1941 was 30.7 per cent. That this ratio is low would seem to be accounted for in the fact that the

---

[15] See Appendix Table 1.

TABLE VI

SUMMARY OF MANUFACTURING IN ARGENTINA
BY INDUSTRIAL GROUPS
For the Year 1941*

Industrial Group	(1) Number of Establish-ments	(2) Number of Employees	(3) Wages and Salaries	(4) Raw Materials Used	(5) Value of Pro-duction	(6) Value Added by Manu-facture	(7) Ratio Value Added to Value of Pro-duction	(8) Av. No. Employees per Estabi.
	No.	No.	Millions of Pesos				%	Av. No.
Foodstuffs	4.448	151.264	224.8	1.503.0	1.930.6	377.9	19.6	34.0
Textiles & mfrs.	1.967	111.294	161.0	570.0	843.5	254.6	30.2	56.6
Machinery & vehicles	2.141	73.391	132.0	181.9	379.9	187.6	49.4	34.3
Metal mfrs.(exc.mach.)	1.511	62.252	88.4	249.2	405.4	143.1	35.3	41.2
Forest prod. & mfrs.	1.964	50.533	53.8	101.1	190.5	86.7	45.5	25.7
Chemicals & mfrs.	538	24.836	38.9	186.5	268.1	70.9	26.4	46.2
Printing & publ.	846	28.608	56.5	72.5	185.9	110.8	59.6	33.8
Leather & mfrs.	752	25.372	38.5	121.5	178.7	54.9	30.7	33.7
Ceramic products	934	28.185	37.9	49.1	141.1	61.5	43.6	30.2
Paper & mfrs.	250	12.686	16.2	61.6	97.7	29.6	30.3	50.7
Rubber mfrs.	56	9.051	11.0	48.7	69.1	17.3	25.0	161.6
Miscellaneous	1.278	65.554	92.0	72.4	183.2	100.6	54.9	51.2
Total	16.685	643.026	951.0	3.217.5	4.873.7	1.495.5	30.7	38.5

*Estadística Industrial de la República Argentina, año 1942, op. cit., pp. 29-32.

manufacture of foodstuffs (the category comprising the largest share of manufacturing establishments, employees, wage bill, cost of raw materials, value of production and value added by manufacture) required only a small labor force in proportion to the raw materials consumed. Perhaps, also, it may be due to the fact that Argentine industry in 1941 was largely that of finishing imported semimanufactures and imported parts.[16]

Textiles, metals and machinery have a low value of production per employee while foodstuffs and chemicals have a high value of production per employee. In the former group of industries the wage bill is the biggest item contributing to the gross value of the product, while in the latter group the cost of raw materials used is the largest item contributing to the value of the product.

Major shifts among the various groups of industries over the period of time studied are also evident.[17] These changes are highly significant in pointing out the direction Argentine industry is heading. For example, the categories of foodstuffs, beverages, and tobacco, and printing and publications[18] had declining portions of the total number of employees, value of production, and value added by manufacture. On the other hand, the categories comprising heavy industries, namely, metal manufactures, machinery and vehicles, chemicals and pharmaceutical products, forest products

---

[16] U.S. Tariff Commission, Mining and Manufacturing Industries in Argentina (Washington, D.C., 1945), p. 16.

[17] See Appendix Tables 1 and 2.

[18] A comment is expedient here. It will be noted that while the printing and publications industry showed decreasing percentages of the total number of employees, value of production, and value added, the industry considered by itself has shown increases in these same phases since 1935. In fact, the progress made in the printing and publishing business in Latin America which was an immediate result of Franco's military revolt against the Spanish Republic has been spectacular. Until then Madrid and Barcelona were virtually the only publishing centers for books in Spanish. In the Spanish-speaking world, Spain alone had the

and manufactures, and paper and manufactures, each accounted for an increasing share of the total number of employees, value of production, and value added. The category of textiles and its manufactures showed a decreasing proportion of the Nation's total employed workers in manufacturing industries, but an increasing share of the value of production and the value added by manufacture. This trend toward heavy industry may well be worth remembering.

Scale of operations.- The typical manufacturing plant in Argentina was rather small in 1941 averaging only 36.5 employees (Table VI), and therefore not able to take advantage of large capacity equipment or mass production methods to any great extent. Production costs are high per unit of output.

The industrial censuses do not contain data permitting one to analyse further the size of industries, based on the number of workers employed, according to the delineation of manufacturing in this dissertation.

From the point of view of the average value of production about half of the number of manufactural establishments valued their production in 1941 at 50.000 pesos and less. Only 795 of the 16.685 establishments had a production valued at more than 1.000.000 pesos and over. Moreover, almost half of the wage earners worked in establishments whose average value of

---

prestige and organization to consecrate a writer and circulate his books to Mexico, Lima, or Buenos Aires. Today books published in these cities are sent to Spain.

As soon as anyone in the Argentine capital has a little money he starts a publishing business. A prevalent joke in Buenos Aires is that whenever two friends meet, they ask three questions now required by Latin American courtesy: "Hello, how are you? How's your family? How's your publishing house going?"

Many of Spain's best workmen and craftsmen became Argentine citizens after the Civil War, and today they are turning out, in Argentina, masterpieces. Germán Arciniegas, "Printed in America," Inter-American, IV, No. 11 (November, 1945), 15.

production was 500.000 pesos and less in that same year, but another two-fifths of the wage earners worked in industries whose average output in value was more than 1.000.000 pesos. There was a marked tendency in 1941 for industries with the highest value of production to attract the largest number of workers, especially foods, textiles, chemicals, ceramics, and metals and machinery.[19]

From the point of view of total value of production in 1941 foodstuffs amounted to almost 2.000.000.000 pesos. Textiles ranked second with more than 800.000.000 pesos. Metals and machinery ranked third and fourth, each with approximately 400.000.000 pesos. Chemicals, printing, leather, ceramics, paper and rubber ranked in descending order with less than 270.000.000 pesos each.

Exceptions to the generalization just stated, that the average plant in Argentina is small, are to be found in the meat packing industry which can boast of plants larger than those of Chicago.[20]

A study was made of the extent of concentration in 14 industries in 1940[21] by the Armour Research Foundation.[22] Their conclusions briefly are these: 1.) the three largest establishments in each of the 14 industries

---

[19] See Appendix Table 3.

[20] Pan American Yearbook, 1945 (New York: Pan American Associates, 1945), p. 69.

[21] See Appendix Table 4.

[22] In 1942 the Armour Research Foundation was commissioned by the Argentine Trade Development Corporation (Corporación para la Promoción del Intercambio) to make a broad and comprehensive survey of Argentine industrial and agricultural possibilities, for the purpose of determining how scientific research could be used most effectively in improving the economy of the Nation. A field group traveled through most of the country. Their findings were synthesized with those of the staff in Buenos Aires that received help from the staff in Chicago, into a report entitled, Technological and Economic Survey of Argentine Industries with Industrial Research Recommendations (Chicago, Illinois: 1943), Project 1-143.

totaled 42 establishments, utilized 22 per cent of the employed workers and produced 41 per cent of the value added by manufacture, and 2.) the 10 largest establishments, in each of the 14 industries, totaled 140 establishments whose total number of employed workers was 43 per cent of the total and yielded 62 per cent of the value added by manufacture. They state further that in many cases the essence of monopoly is present and is limited only by such competition as can surmount the high tariff walls.

Monopoly infers control over supply and therefore over price. However, a monopolist's control over price may be limited because he has control only over a partial supply of goods (substitutes are always on the market), and also, because the demand for his product is highly elastic.[23] The demand may be so elastic that the seller's best price is little different from that of others selling products which are almost identical.[24]

The monopolist tries to market his product at a price which will bring him the greatest possible net return. And, whether monopoly price is fixed high or low is due to the elasticity of demand.[25]

On the other hand, monopoly prices are higher than competitive prices because prices decrease as sales increase for the monopolist. With each increase in sales, the marginal price declines and thus, the entire output is affected, not only the marginal sales. Maximum net returns are to be

---

[23] A demand schedule which shows that the quantity of a good that would be purchased is so highly sensitive to price that a larger total amount would be expended for the good at a low price than at a high price is said to be elastic. The large quantity of a good that would be disposed of at a lower price would more than compensate for the loss of revenue suffered through acceptance of a lower price, as for example, luxuries. P. F. Gemmel, Fundamentals of Economics (New York: Harper and Bros., 1943), Ch. 20.

[24] Ed. Chamberlain, The Theory of Monopolistic Competition (New York: Harvard University Press, 1938), Ch. IV.

[25] Gemmel, loc. cit.

obtained by limiting production at the point where marginal revenue equals marginal cost. That point is reached with a smaller volume of output and a higher price under the conditions of monopoly than under those of competition.

Even in the case of oligopoly, as in Argentina, the price is set by a few big businessmen, who keep constant watch on one another's price structure. If one lowers his price, or raises it, all will follow suit in order to share in the increased sales and profits.

The semi-monopolistic nature of Argentine industry places Argentina in a dilemma, that is, prices are higher than under competition, and since the market is limited only a small number of large plants is feasible. If the Argentine market is to be supplied by home industries, it is confronted with the choice between high costs due to small-sized plants and high costs due to semi-monopolistic practices.[26]

The attempt to remedy this situation by permitting foreign goods to compete with domestic goods, and thus lower the price of these goods to the consumer, would present a further dilemma.[27] At the present time such a policy is remote from the minds of the Government officials for they are propagandizing the nationalization of industry which is to be protected by high tariff, and any other regulations deemed necessary to help industry to flourish.

Manufacturing industries show also a high degree of concentration as to geographic location. In 1941 the Central Agglomeration, comprising the Federal Capital and the Provinces of Buenos Aires, Santa Fé, Entre Rios and Córdoba, boasted 54.1 per cent of the Nation's establish-

---

[26] Armour Research Foundation, op. cit., pp. 89-92.

[27] Ibid.

ments, 88.2 per cent of the employed workers, 59.4 per cent of the primary motors, 89.2 per cent of the wage bill, 94.0 per cent of the fuels and lubricants consumed, 89.6 per cent of the value of production, and 88.9 per cent of the value added by manufacture (Table VII and Fig. 4).

The detached manufacturing areas mostly in the Provinces of Mendoza and Tucumán, in the Territory of the Chaco, and other minor areas contributed collectively only about 10 per cent to the Nation's manufactural efforts.

Furthermore, the concentration is still more intense within the Central Agglomeration than one is readily inclined to believe. Comparing the Federal Capital and the Province of Buenos Aires with the Nation as a whole, for the year 1941, one will discover some glaring facts. Of the total number of manufacturing establishments 43.3 per cent were in the Federal Capital and 23.6 per cent in the Province of Buenos Aires, or a total percentage of 66.2 in the Federal Capital and the Province of Buenos Aires.

That same inner zone had 74.9 per cent of the salaried workers, 74.0 per cent of the wage earners, or a total of 74.2 per cent of the employees, 77.6 per cent of the value of production, and 77.5 per cent of the value added by manufacture.

Once again, statistical data that would permit appropriate calculations to be made according to the delimation of manufacturing used in this dissertation are unavailable showing the localization of manufactural industries within that inner zone. With the data presented thus far, plus a careful scrutiny of a physical-political map of Argentina[28] one may infer

---

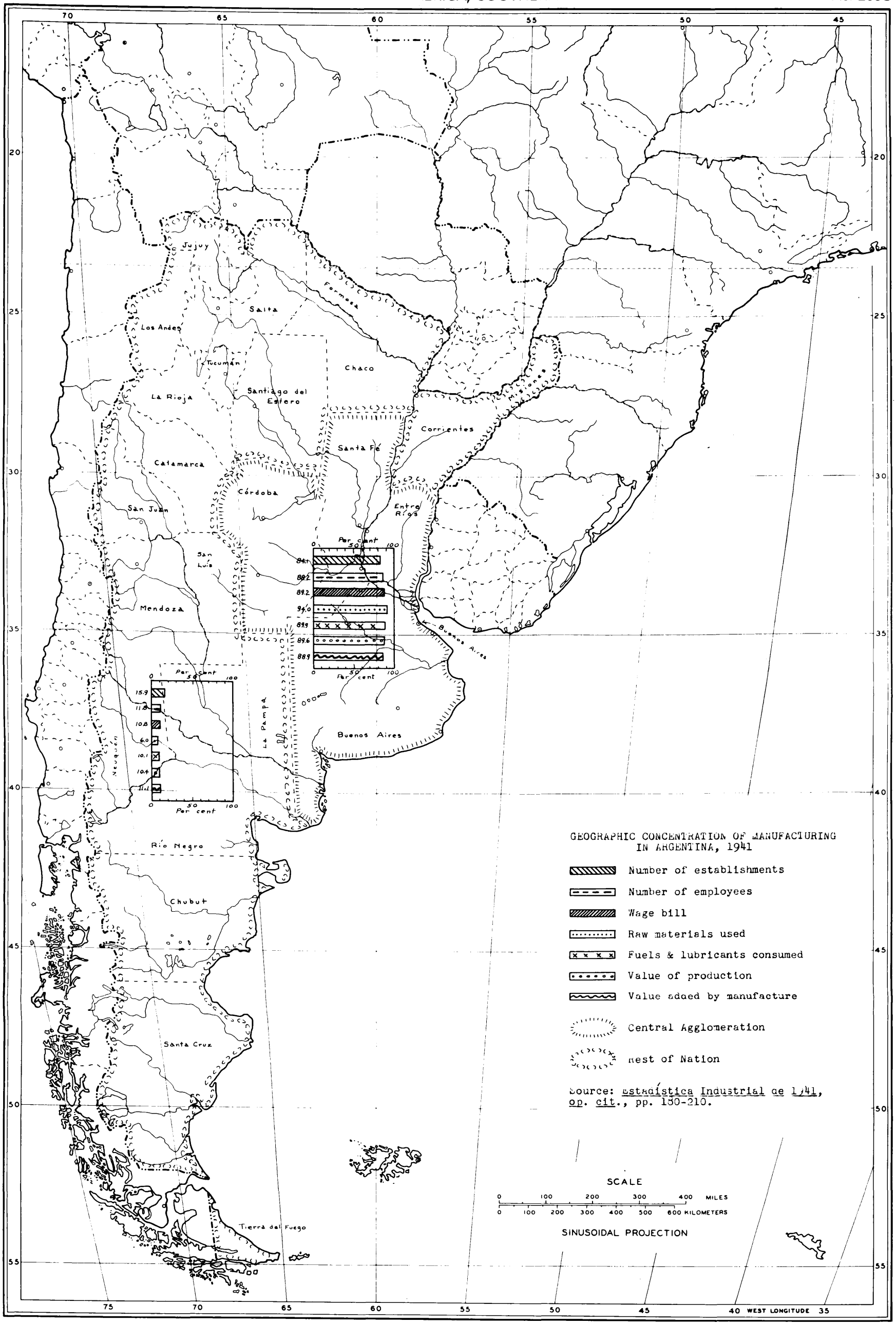
[28]These physical-political maps of Argentina are recommended: 1.) Man of the Americas: South America: Sheet South (New York: American Geographical Society, 1942), Scale 1:5.000.000; 2.) Map of Hispanic America (referred to as "The Millionth Map"), Ibid., Scale 1:1.000.000,

TABLE VII

GEOGRAPHIC CONCENTRATION OF MANUFACTURING IN ARGENTINA, 1941*

Province or Territory	No. of Establishments	Employees	Primary Motors	Wages & Salaries Paid	Raw Materials Used	Fuels & Lubricants Consumed	Value of Production	Value Added by Mfr.
	No.	No.	h.p.	Thousands of Pesos				
CENTRAL AGGLOMERATION								
Federal Capital	7.226	293.207	44.093	471.983	1.443.549	25.294	2.150.200	716.940
Buenos Aires	3.934	183.418	149.831	261.268	1.119.677	53.600	1.634.203	442.599
Santa Fé	1.548	53.453	58.129	72.577	312.529	8.109	431.935	106.608
Córdoba	906	21.431	24.671	25.938	83.691	5.944	128.578	37.786
Entre Ríos	416	13.287	20.075	16.932	64.810	5.597	96.054	25.331
Total	14.030	564.846	296.799	848.698	3.024.256	98.544	4.440.970	1.329.264
Per cent of Republic	84.1	88.2	59.4	89.2	94.0	89.9	89.6	88.9
DETATCHED AREAS								
Mendoza	557	15.554	12.144	21.495	62.116	2.810	95.370	28.879
Tucumán	337	13.620	99.185	25.448	70.437	4.047	117.690	43.387
Chaco	258	6.867	22.299	8.536	45.053	959	65.318	19.016
Total	1.152	36.041	133.628	55.479	177.606	7.816	178.378	91.282
Per cent of Republic	6.9	5.6	26.7	5.8	5.5	7.1	5.2	6.1
ALL OTHER AREAS								
Total	1.503	42.139	69.476	46.809	15.611	3.234	254.348	74.930
Per cent of Republic	9.0	6.2	13.9	5.0	0.5	3.0	5.2	5.0
GRAND TOTAL FOR REPUBLIC	16.685	643.026	499.903	950.986	3.217.473	109.594	4.873.696	1.495.476
Total per cent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Estadística Industrial de 1941, op. cit., pp. 180-210.



GOODE'S SERIES OF BASE MAPS
HENRY M. LEPPARD, EDITOR

FIGURE 4

Prepared by Henry M. Leppard
Published by the University of Chicago Press, Chicago, Illinois
Copyright 1941 by the University of Chicago

that approximately three-fourths of the Nation's manufactural production might be found in and near the city of Buenos Aires.

Several factors account in part for this great concentration of manufacturing in and around Buenos Aires. This region contains the largest number of consumers with the highest purchasing power in the country. Buenos Aires is the leading port in the country and normally handles about 65 per cent of the imports. Industrialists can easily procure their raw materials, semimanufactures and fuel. It is a very convenient location for those interested in assemblage. Where the product is more bulky than the materials from which it is made, the pull on industry toward the market may be strong. It also has the largest pool of labor in the country. And, because all transportation lines focus on Buenos Aires, it is a most convenient place for assembling and processing those domestic raw materials destined for export, and for the immediate home market.

Industries which depend largely on foreign sources for their raw materials, as some in Argentina do, tend to be attracted to seaboard locations, not entirely because of loss of weight in processing, but because of a combination of reasons, including prompt delivery, convenience of assembly, and nearness to major markets. Almost all plants must be located where they can be assured a steady supply of power. Argentina's chief source of power is steam generated from imported coal. These power plants obviously are located on the littoral.

On the whole one may conclude that manufacturing in Argentina is largely market-oriented in lieu of the fact that both the domestic and foreign raw materials move to mills and factories in the Buenos Aires

---

Sheets SI 20, SI 21, Sj 20 and Sj 21; and 3.) Mapa de la República Argentina (Buenos Aires: Instituto Geografico Militar, 1937), Scale 1:1.500.000, being 6 sheets on Argentina.

conurbation for fabrication purposes.[29]

Geographic resources for manufacturing in Argentina.--The geographic resources upon which the manufacturing industries in Argentina depend consist of those human and natural resources, both at home and abroad, which are synthesized into munificent forms of fabricated products destined for sale in the foreign market as well as in the home market. Argentine industry depended for three-quarters of its supplies of raw materials on the farms, the grazing lands, and the forests in the country, and for the remainder, fuels and lubricants, and capital goods equipment, on foreign sources, in 1941.

A nation desiring to manufacture is in a particularly advantageous position if it has within its borders all the necessary supplies of raw materials which can be obtained easily and cheaply. No nation today finds itself in that position. Each must depend upon outside sources for critical and strategic raw materials,[30] and, even in some cases, for certain essential needs.[31] If these outside supplies can likewise be obtained easily and cheaply, industry will function on an economic basis, other things being equal. To be sure, the scramble of nations for sources of raw materials is every bit as popular today as it was in days of yore.

---

[29]Added transportation costs may be a limitation for as the concentration of an industry becomes greater than that of the sources of its raw materials, the quantity of transportation required for assembling material increases. This constitutes the chief obstacle to the complete realization of large-scale production and geographic concentration. National Resources Planning Board, op. cit., p. 251.

[30]Strategic materials - those materials upon which a nation is dependent wholly or in part on sources outside the limits of the country. Critical materials - those materials that are easier to obtain either because they are somewhat less necessary or because they may be procured in more adequate quantities from domestic sources. E. Newhall, Latin American As A Source of Strategic and Critical Materials, Special Publ. Pan American Day, April 14, 1943 (Washington, D.C.: Pan American Union, 1943).

[31]See Chapter II for a discussion of Argentina's essential materials.

Witness the recent trade commissions that rushed to the Argentine from several of the world's leading nations as soon as World War II ceased. Competition for the purchase of flaxseed, frozen and chilled meat, hides and skins, to mention only a few of the products, was very great.

Argentina, too, is interested in procuring certain raw materials from abroad at prices which will enable her to have a favorable balance of trade and thus maintain her purchasing power and standard of living. In 1941, Argentina used in her manufacturing establishments raw materials of national origin valued at 2.435.200.000 pesos and of foreign origin 782.300.000 pesos. In percentage, 75.6 per cent of the raw materials were of domestic origin, with 24.4 per cent imported. An examination of Table VIII showing the leading items of trade for the year 1941 indicates the commodities for which Argentina probably has a surplus for export: meat, cereals and flaxseed, wool and hides, and those in which she undoubtedly has a deficiency: textiles and manufactures (high quality), fuels and lubricants, iron and manufactures, chemicals, and machinery and vehicles.[32]

The Armour Research Foundation compiled an interesting table of Argentine production, importation, and exportation of typical raw materials for 1939.[33] These data supplement and enlarge upon the idea that Argentina depended on imports to supply her with essential raw materials for manufacturing and on other countries to purchase her surplus agricultural-pastoral products. Since 1931, and especially within the last few years, manufactured

---

[32]According to the International Economics and Statistics Unit, United States Bureau of Foreign and Domestic Commerce, the conversion of foreign trade statistics to United States dollars is as follows: Exports, 1 peso = 1937, $0.3279; 1938, $0.2922; 1939, $0.2920; 1940, $0.2900; 1941, $0.2809; 1942, $0.2793; and 1943, $0.2869. Imports, 1 peso = 1937, $0.3096; 1938, $0.2931; 1939, $0.2591; 1940, $0.2545; 1941, $0.2464; 1942, $0.2522; and 1943, $0.2510.

[33]See Appendix Table 5.

TABLE VIII

FOREIGN TRADE OF ARGENTINA, 1941*

Principal Groups	Million Paper Pesos
EXPORTS	
Animals & animal products	909.7
Agricultural products	346.9
Manufactural products	120.2
Forest products	41.4
Mineral products	32.5
Game & fish products	13.9
Total	1.464.6
IMPORTS	
Textiles & mfrs.	225.5
Fuels & lubricants	184.5
Iron & mfrs.	145.7
Chemicals & mfrs.	112.7
Machinery & vehicles	106.8
Metals (exc. iron mfrs.)	94.8
Wood & mfrs.	86.0
Foods	75.9
Paper & mfrs.	68.9
Ceramics	41.8
Rubber & mfrs.	28.4
Beverages	18.8
Tobacco & mfrs.	7.5
Others	74.1
Total	1.276.6

*República Argentina. Ministerio de Hacienda. Dirección General de Estadística de la Nación. Anuario del Comercio Exterior de la República Argentina. 1941 (Buenos Aires: 1942), pp. 18, 32 and 146-60.

products have contributed an increasing share of Argentine exports (Table IX).

Each of the major categories of manufacturing in 1941 is shown in Table X on the basis of its use of raw materials of national and of foreign origin. The large manufactural industries that relied on domestic sources for more than half of their raw materials were: leather and manufactures; foodstuffs, beverages and tobacco; stone, earthenware, glass and ceramics; textiles and manufactures; chemicals and pharmaceutical products; and paper and manufactures. On the other hand, the remainder of the large groups of manufacturing depended on foreign sources for more than 50 per cent of their requirements of raw materials, these being: forest products and manufactures; printing and publications; metal manufactures; machinery and vehicles; and rubber manufactures.

These ratios will characterize the raw material picture for some time to come since the largest industries, by value of production are foodstuffs and textiles,[34] both of which are dependent upon domestic sources of raw materials, the source region being chiefly in the environs of Buenos Aires. The Pampas with their deep, fertile, stone-free soils supply the bulk of the raw materials for the food processing industries, and the newer farming region in the north produces the raw cotton.[35] Wool comes from the cooler, wind-swept grasslands of distant Patagonia. Mineral production, principally

---

[34]Argentina is almost self-sufficient in the production of foodstuffs and beverages. Her local industry supplies 60 per cent of the woolen goods, 40 per cent of the cotton goods, and 100 per cent of the knitted goods required. H. Davies (ed.), South American Handbook, 1944 (London: Trade and Travel Publications, 1945), p. 147.

[35]Cotton acreage between 1926 and 1936 increased 500 per cent. Future possibilities are said to be excellent in the Provinces of Chaco, Formosa and Corrientes, and in the neighboring Provinces of Santiago del Estero and Santa Fé. Rapid expansion had been due largely to official

TABLE IX

VALUE OF ARGENTINE EXPORTS, BY MAJOR GROUPS, 1937 to 1944*

Year	Animal Products	Agri. Products	Mfg. Products	Forest Products	Mineral Products	Game Products	Total
1937	727.9	1.468.6	24.0	45.8	16.7	8.0	2.311.0
1938	638.3	644.2	32.4	41.4	17.4	6.8	1.400.5
1939	682.7	767.0	45.2	46.0	18.8	5.5	1.573.2
1940	700.5	595.9	70.0	33.6	21.3	6.1	1.427.6
1941	909.7	346.9	120.3	41.4	32.5	13.8	1.464.6
1942	1.083.9	386.6	233.4	42.1	32.5	10.4	1.788.9
1943	1.157.1	496.9	425.0	46.0	43.0	24.2	2.192.2
1944	1.340.1	596.1	340.8	40.0	26.3	9.6	2.352.9

*Anuario del Comercio Exterior de la República Argentina, 1938 to 1944, op. cit.

TABLE X

PERCENTAGE OF VALUE OF RAW MATERIALS USED BY MANUFACTURAL INDUSTRIES, 1941*

Major Industries	National	Foreign
	Per Cent	
Leather & manufactures	95.8	4.2
Foodstuffs, beverages & tobacco	94.7	5.3
Stone, glass & ceramics	71.5	28.5
Textiles & manufactures	71.0	29.0
Chemicals & manufactures	65.4	34.6
Paper & manufactures	65.0	35.0
Forest products & mfrs.	43.1	56.9
Printing and publishing	38.1	61.9
Metal mfrs. (exc. mach.)	37.1	62.9
Machinery & vehicles	37.0	63.0
Rubber manufactures	31.1	68.9
Others	65.9	34.1
Total Manufactural Industries	75.6	24.4

*Estadistica Industrial de 1942, op. cit., p. 36.

in the Andean Regions, is wholly inadequate for the needs of industry largely because the known and worked deposits are widely scattered and remote from the centers of industry. Petroleum production is an exception. Even in this case the total production in 1941 fell short of the total consumption by almost 30 per cent and outside sources had to be relied upon to supply the deficit. Forest resources are dwindling and unless conservation measures are inaugurated at once, distinct shortages of forest products will continue to prevail in the future.

As for the human resources, upon which industry must depend for its labor supply and domestic market, little accurate information can be supplied. It has already been stated that no general census of the country has been taken since 1914. All population totals since then are estimates, both official and unofficial. Perhaps the most reliable of the recent estimates of the total population of the country are those made by the Dirección General de Estadística de la Nación. His total estimate for 1941 was 13,516,927 people. The natural increase from 1914 to 1941 was 81.5 per cent while the increase due to migration between these same years was 18.5 per cent.[36] The average density per square mile in 1941 was 12.5, but averages mean little or nothing in a country where the population is distributed as unevenly as it is in Argentina. There are great concentra-

---

encouragement, and dates from the announcement of the cotton-curtailment program of the United States Government. The chief problem is to find an adequate labor supply. Most of the cotton is grown by small planters who are financed by various purchasing companies. The living conditions are very primitive and the climate of the Chaco, which produces more than 90 per cent of the cotton, is not conducive to white colonization. C. H. Harring, "Depression and Recovery in Argentina," Foreign Affairs, 14 (April, 1936), 509-11.

[36] República Argentina. Ministerio de Hacienda. Dirección General de Estadística de la Nación. La Población y el Movimiento Demográfico de la República Argentina en los años 1941 y 1940 (Buenos Aires: 1942), Informe No. 89, pp. 6, 11.

tions of people in the few large cities of the country and an almost complete absence of population for hundreds of square miles in many of the big wide open spaces of the south.

Of the total population in 1941, 71.3 per cent were concentrated in 21.1 per cent of the area, in the Federal Capital and the Provinces of Buenos Aires, Santa Fé, Entre Ríos and Córdoba, the sector referred to in this dissertation as the Central Agglomeration.

Argentina undoubtedly has the most homogeneous and the most highly urbanized population of any of the major Latin American countries. It, also, is the first to show signs of approaching a stationary population.

In 1930 the rural population was estimated to be 32 per cent of the total population, while the urban population (towns with a population of more than 1,000 people) was estimated at 68 per cent of the total population of the country.[37] By 1938 these ratios had changed considerably. There were in the latter year 74 per cent of the total population classified as urban and 26 per cent as rural.[38] Since 1938 the rural population probably has declined still further, both in absolute and percentage figures. The rural decline implies a large rural-urban migration. Between 1930 and 1939, an estimated 260,000 rural dwellers, or 7.3 per cent of all such persons, migrated to the towns. This rural exodus, plus foreign immigration helps to account for the great expansion of the urban population. The total population of Argentina increased 74.6 per cent between 1914 and 1943, while that of the cities showed a phenomenal growth, between these same years, of 106 per cent.[39] The increasing mechanization of agricultural practices on

---

[37]Kingsley Davis and Ana Casis, "Urbanization in Latin America," The Milbank Memorial Fund Quarterly, XXIV, No. 2 (April, 1946), 202-6.

[38]Alejandro E. Bunge, Una Nueva Argentina (Buenos Aires: 1940), p. 158.

[39]Davis, op. cit.

the large estancias and latifundios along with the increasing importance of pastoral activities have helped to account in part for this rural exodus. Simultaneously, the increase in manufactural activities, especially in Greater Buenos Aires, has attracted migrants in search of a livlihood. Thus, two forces have been at work, agriculture pushing and industry pulling, that have resulted in the great augmentation of the urban population of the country. Bunge states, "The large growth of cities is a modern phenomena common to all civilized countries. But Argentina has surpassed all of them in the tendency...., with the exceptions only of Holland and Great Britain."[40]

Modern cities have shown a characteristic phenomenon in respect to the rate of natural growth (the difference between the number of births per 1,000 and the number of deaths per 1,000 people) of their population. At first, with the improved sanitation and the advanced medical science the death rate drops and, with the birth rate remaining unchanged, the rate of natural growth increases for a time. Then, largely due to economic and social factors, the number of births per 1,000 population starts to decline, thus resulting in a narrowing of the rate of natural increase. In due time the population becomes stationary and subsequently begins to decline. The urban population of Argentina is already approaching the stationary level.

The population pyramid for Argentina had a very broad base in 1914, representing a large proportion of youth to the total population, but showed a much narrower base in 1936 with a greater number of people in the higher layers of that pyramid. This indicated an aging population.

The birth rate, for the country as a whole, was 34 per 1,000 popula-

---

[40] Bunge, supra.

tion in 123, 24 per 1.000 in 1936,[41] and had fallen to 23 per 1.000 by 1946.[42] The natural growth which was 19 per 1.000 in 1923 dropped to 12 per 1.000 by 1936.[43]

What the goal of Argentina's demographic expansion should be is a matter of pure conjecture. Bunge's estimate of the probable future population by 1988 is based on two hypotheses. One assumption is that, in the period 1936 to 1988, the immigration policy would be a negligible factor affecting population statistics, and that the natural growth would be constant at the 1936 figure (11.9 per 1.000 in 1936; 13.9 per 1.000 in 1943). By 1988, he concluded, the population of the Nation would have fallen to 11.500.000 persons. The second assumption is that, during that same period, 1936 to 1988, there would be an annual migratory influx into Argentina equal to 1 per 1.000 of the existing population. He concluded that the population of the Nation might then be 15.600.000 by 1958, 17.000.000 by 1968, and 20.000.000 by 1988.[44]

The implications of these population tendencies are many and far-reaching to the Argentine industrialist. The rural-urban migration of young adults and their associated wealth into the cities, and especially into Greater Buenos Aires, is advantageous from the point of view of industry. A reliable reservoir of unskilled labor, a growing supply of skilled labor and investment capital can be drawn upon. From the point of view of the national economy, however, the rest of the country will suffer.

---

[41] R. G. Mata and E. Llorens, Argentina Expansion (Buenos Aires: 1940), pp. 19-21.

[42] "Argentine Economic Prospects and Policy," Rev. of the River Plate, CI, No. 2849 (July 19, 1946), 21.

[43] Mata and Llorens, supra.

[44] "Population Prospects Half a Century Hence," Rev. of the River Plate, XCVII, No. 2766 (December 15, 1944), 5.

Certain Government officials have plans on paper for the decentralization of industries. During World War II some new industries, as in the United States, were established in the interior of the country. A de-population of the Pampas or of any other parts of the country is a factor pulling in the wrong direction insofar as the economic development of the potential natural resources is concerned. Industry in Argentina needs a much wider home market than it now has. The purchasing power of the industrial workers in Buenos Aires is naturally higher than that of the peons in the remote rural areas. It would seem that one of Argentina's biggest problems is a social problem, that of providing a better means of subsistence for a larger number of people and by so doing increase the size of the market.[45] In turn, this expansion will absorb more of the products of industry, and the upward spiral will begin. Industry will expand, bringing a greater return in wages to the worker and in interest to the owner of the capital goods. As of now the domestic market is limited both by the low purchasing power of the rural peoples and by a small total population which is showing little signs of increase.[46]

---

[45] The larger the market for a commodity the smaller generally are the fluctuations in price, and the lower is the percentage of turnover which dealers charge for doing business in it. Alfred Marshall, Principles of Economics (New York: Macmillan, 1927), Bk. V, Ch. I, p. 326.

[46] Two missions were sent to Europe late in 1946 in an effort to arrange for 4,000,000 persons to emigrate to Argentina during the next 10 years. One mission, headed by a Catholic priest who was given the rank of an Ambassador, was to have headquarters in Italy. Heading the other million was a career diplomat who was expected to seek emigrants from France and Spain. "Peron Seeks 4 million to Settle Argentine," Washington Evening Star (November 30, 1946).

The Nation was especially seeking agricultural workers and technicians in Italy, Spain, Iceland and the Low Countries for naturalization. New York Times (April 20, 1946).

Dynamic Nature of Argentine Manufacturing[47]

One may readily agree with Torquato di Tella, a prominent Argentine industrialist, who, in an address before the Instituto Popular de Conferencias in Buenos Aires, in 1943, referred to the Argentine industry as one that has "begun wearing long trousers."

> This characterization was not an expression of wishful thinking by an overzealous nationalist, nor was it prompted by considerations of a political order. It was rather a sober recognition of the fact that the economic development of Argentina has entered a new phase; it expressed satisfaction with the progress of Argentine industry in the past three decades; and it voiced the desires and aspirations of a large and growing sector of Argentine society. Argentine industry has come of age, and that means that this sector of the national economy demands and must receive at least as much attention and recognition as has until now been accorded only to agriculture and cattle breeding.[48]

Early beginnings.-Industry in the early days in Argentina was characterized as being of the handicraft and household type, primitive and inadequate, and largely situated in the interior where it could supply local needs most conveniently. Manufacturing of the factory type did not occur until the latter quarter of the nineteenth century, primarily in response to the building of railroads. A period of economic development and prosperity, furthered by immigration and inflow of foreign capital, followed.

With the inception of modern manufacturing, moreover, there was a tendency for the new industries to be situated on the littoral where they could profit from trade with other American nations and even foreign countries. The few handicraft industries still surviving, soon declined after

---

[47] By dynamic nature of manufacturing is meant the changing composition of the manufacturing output as one phase of a continuing economic system. Any attempt to describe manufacturing for a given year presents an admixture of continuous and transitory elements.

[48] Seymour E. Harris, Economic Problems of Latin America (New York: McGraw-Hill Co., 1944), p. 225.

1890 due largely to technical backwardness, cheapness of imported goods, and the concentration of population in cities on the littoral.

The financial crisis of 1890 and the resultant depreciation of the peso in order to increase exports, the higher cost of imported goods, and the immigration of skilled labor, were responsible, in large measure, for the development of modern industry.

Many leading industries were founded in the period before 1914, namely, processing of foodstuffs and the fabrication of non-durable consumer goods. Several meat packing establishments (*frigoríficos*) were erected between 1882 and 1886, but shipments of frozen meat were not important until after 1900. With the building of the port of Buenos Aires in 1901, flour mills and grain elevators were built on land reclaimed from the Río de la Plata. The manufacture of footwear was accelerated after 1903 when an American shoe-machinery concern established a branch office in Buenos Aires.[49]

The growth of manufacturing during this early period, was closely associated with the development of abundant hydro-electric power. Argentina, being poor in waterpower resources, depended upon steam generated from imported coal. A number of shoe factories were started in Córdoba in response to the cheap power generated from nearby waterfalls. The use of electric power in sugar mills (with bagasse as fuel) began around 1911.[50]

The Census of 1914 listed such industries as *frigoríficos*, sugar mills, flour mills, leather shoes, alpargatas (Spanish-style canvas shoes with rope soles), shirts and collars, woolen and cotton cloth, knit goods,

---

[49] George Wythe, "The New Industrialization in Latin America," Journal of Political Economy, 45 (April, 1937), 207-228.

[50] _____, Industry in Latin America (New York: Columbia University Press, 1945), p. 82.

furniture and upholstery, carriages, leather working, finished iron manufactures, brick making, foundry products, matches, soap, candles, glassware, cigarettes, paper and cardboard.

Just as Argentina was on the verge of a panic due to crop failures and overexpanded industries World War I began. Manufacturing was stimulated as a result of shipping shortages and the Allied restrictions on exports.

The food-processing industries increased in number and size due mostly to the accelerated demand in the belligerent countries for foodstuffs. Cotton spinning, the making of furniture and boxes, and the fabrication of sulphate of aluminum (for water filtering) developed. The manufacture of wearing apparel increased and the assembling of automobiles began.

Not all these war-time plants were able to survive the sharp competition of the inter-war years, but the manufactural basis was broadened and solidly established in the twenties.[51] Many old industries were expanded and even new ones built. This period was also characterized by the tendency of foreign companies to establish branch factories.

Imports did not resume pre-war levels until the twenties. The Argentine economy had to be geared to an expansion of the internal market. The lessons of war pointed the way to diversification of industry, and thus to freeing the country, once and for all, from such heavy dependence on foreign sources for the necessities of life.[52]

A strong nationalistic feeling and the desire for greater self-sufficiency in the future were growing sentiments in the Argentine. In 1924 a leading Argentine economist declared that: "This was the last generation

---

[51] Wythe, op. cit., p. 83.

[52] A. V. Dye and G. Wythe, "Manufacturing Progress in Argentina," Bulletin of the Pan American Union, 70, No. 8 (August, 1936), 615-30.

of importers and ranchers (estancieros), and that the next generation would consist of farmers (agricultores) and manufacturers."[53]

In character Argentine industry was still finishing, rather than inceptive. It required the import of materials in a more or less highly advanced state of preparation. It continued to set its prices below similar imported articles, and to offer them on the market as imitations of imported goods. Certain industries feeling the post-war competition of foreign producers (the manufacturers of boots and shoes, paper, building materials, iron products, jewelry, edible oils, chemical products) clamored for more protection.[54] The tariff was revised upward in 1923.[55]

To demonstrate to the public that many imported articles could be produced at home at lower prices, and to lessen the prejudice against local goods, a National Industrial Exhibition was held from December, 1924 to March, 1925.[56]

---

[53] "Manufacturing Developments in Argentina," U.S. Bur. For. and Dom. Com., Trade Inf. Bull., No. 820 (1934), 3.

[54] Gt. Brit. Department of Overseas Trade. Report on Economic and Commercial Conditions in the Argentine Republic, September, 1923 (London, H.M.S.O., 1924), pp. 37-38.

[55] In 1905, the tariff law of that year, provided for a duty of 25 per cent ad valorem (based on c.i.f. values) on all imports not specifically enumerated in the schedule. Ad valorem rates of duty levied on official valuations ranged from 5 to 50 per cent of such valuations. Minimum duties of 5 to 20 per cent usually applied to goods not produced in Argentina, and duties of 30 to 50 per cent were levied on goods similar to those manufactured within the country.

In 1920 customs valuations were increased by 20 per cent partly to offset the rise in prices during the war. In 1923 another general increase, amounting to 50 per cent, was made in the official valuations. Also, specific duties were increased by one-fourth, a surtax of 2 per cent (of the official valuation) was imposed on all commodities subject to ad valorem rates of 10 to 20 per cent, and a surtax of 7 per cent when the ad valorem rates exceeded 20 per cent. U.S. Tariff Commission, Economic Controls and Commercial Policy in Argentina (Washington: 1945), pp. 10-11.

[56] Gt. Brit. Dep't. of Overseas Trade, Misc. No., 1925, (1925), pp. 58-59.

> The exhibits consisted principally of woolen, cotton and silk manufactures, boots and shoes, leather goods...., sports goods, hats, brushes, commercial books, industrial and agricultural machinery and accessories, scales and weighing machines, motor car accessories, metallic work in iron, brass and nickel plate, electrical material, ironmongery, lead pipes, sheets, shot and solder, tin piping, brass and iron work...., bolts, nuts, and screws, enamelled ware, glass ware, furniture...., groceries, beverages...., essences, perfumes, soaps and face powder.[57]

Many of the industries were unable, at that time, to compete with the higher quality foreign goods, especially those made in the United Kingdom. The demand did not slacken for the higher quality products.

By 1929 the problem of overproduction had to be faced with drastic price-cutting. Competition from imported articles was also felt in some lines. Protection over and above that granted in 1923 was still advocated.[58]

From 1928 to 1932 the value of exports declined 54.2 per cent, that of imports 52.8 per cent, and the average prices of agricultural-pastoral products by 51.6 per cent.[59] This resulted in an unfavorable balance of trade for Argentina.

Manufacturing developments since 1931.-The next decade marked the principal development in Argentine industry. In fact, the Nation became virtually self-sufficient in several lines of manufacturing, and even built up an export trade in certain commodities. The period of rapid

---

[57] Ibid.

[58] Changes in rates of duty were relatively unimportant between 1923 and 1930. After 1931 valuations exceeded those established in the basic law of 1905 by about 60 per cent. An additional duty of 10 per cent was imposed, October, 1931, on the revised valuations for most dutiable goods. This was intended as a temporary revenue measure, but has continued to be applied ever since to various commodities. U. S. Tariff Commission, op. cit., p. 11.

[59] Wythe, op. cit., p. 83.

industrial expansion had begun. There was a definite shift from export markets to a balanced internal economy due to both internal and external economic pressures. The causes of the new and rejuvenated spirit of industrialism are not difficult to comprehend.

The principal causes of industrialization growing out of the depression from 1930 to 1933, according to Dorfman, a leading Argentine engineer and economist, have been: 1.) decrease in Argentine exports, in value and tonnage, 2.) increase in customs duties from 1931, 3.) devaluation of the peso, 4.) government regulation of the imports, in order to adjust them to the level of the Argentine market, 5.) existence of abundant labor, cheap and competent, 6.) existence of a consumer market relatively important, 7.) presence of developed auxiliary industries, 8.) the dismantlement of industries in the more advanced countries (as for example the United States) that left inactive valuable plants whose utilization it was to procure, 9.) existence of conditions for export of capital and technicians in these countries, as a result of the displacement by the crisis in the employment and need for occupation, 10.) the great advantage that prompted the industrial activity in a country insufficiently developed economically, and 11.) the need of adjusting production to the desires of the consumer and to be able to offer it a flexible opportunity.[60]

It is well to elaborate on some of these factors as well as to enumerate others not mentioned by Dorfman.

The balance of payments that was unfavorable to Argentina during the latter years of the depression, caused by the great drop in exports together with the high prices of imports, resulted in an outflow of gold from the country. The Government, therefore, took three measures to check

---

[60]Adolfo Dorfman, Evolucion Industrial Argentina (Buenos Aires: 1942), p. 101.

the import of consumer goods and to stimulate domestic manufacturing of similar products. These were: (1.) depreciated the peso, which increased the cost of foreign goods, (2.) revised upward many import duties in 1931 in order to reduce demands for exchange, and (3.) established exchange control in October, 1931, which favored the importation of raw materials (including fuels) and necessities, but penalized luxuries.[61]

Depreciation of the peso.--In Argentina the peso which had a par value of 42 cents depreciated to a value of about 25 cents.[62] For some time before the United States went off the gold standard, the official rate established by the Argentine Exchange Control Board was 3.65 pesos per dollar, or a peso valued at 26 cents. With a decrease in value of the peso in relation to foreign currencies, importers were forced to increase their peso prices to Argentine consumers.[63]

Local manufacturers were placed at an advantage over importers because their costs of production were increased only to the extent that imported raw materials entered into their finished products. The costs of native raw materials, labor, and overhead costs were little influenced by currency depreciation. Even though the domestic product was inferior to the imported article, importers were unable to compete with domestic manufacturers in supplying the domestic market.

Argentine tariff.--Bilateralism, or the channelling of trade in order to extend preference to those countries with whom Argentina had an export balance of trade, was the characteristic principle governing the commercial

---

[61] Wythe, op. cit., p. 83.

[62] The years are not mentioned by this writer, but the first peso value probably refers to the year 1914 and the second to the years immediately preceding 1933.

[63] D. M. Phelps, "Industrial Expansion in Temperate South America," American Economic Review, 25, No. 2 (June, 1935), 273-82.

treaties which Argentina signed with other nations prior to 1940. An official of the United States Tariff Commission has said, "Nations went to war for exports; now for imports."[64]

During the thirties the tariff was designed primarily as a revenue measure and secondarily as a means of protection for industry and agriculture. More significant than the tariff in restricting imports was the rigid system of exchange control that went into effect in 1931 and purposed the fostering of exchange balances and certain industries, the subsidization of selected exports, the raising of revenue and the stabilization of the currency.

The basic law governing the Argentine tariff is the Tariff Act of 1905 as revised by the laws 1911, 1923, 1931 and 1939.[65] The rate structure as a whole consists of a set of basic ad valorem rates levied on fixed official unit valuations. The duties are nominally ad valorem,[66] but the tariff law is supplemented by a schedule of official fixed unit valuations (aforo medio) for many goods.[67] These valuations or assessments are seldom related to the current market values because they are largely the 1905 assessments. On most imports, then, the ad valorem rates are in effect specific.[68] A large number of commodities are subject to surtaxes

---

[64] Interview granted by Mr. David Lynch, Economist, United States Tariff Commission, January 17, 1947.

[65] U.S. Tariff Commission, op. cit., p. 10.

[66] Ad valorem - a certain percentage of the value of the goods. W. H. Carter and R. E. Dodge, Economic Geography (New York: Doubleday, Doran and Co., 1939), p. 169.

[67] República Argentina. Ministerio de Hacienda. Dirección General de Aduanas, Tarifa de Avalúos y Arancel de Importación (Buenos Aires: 1939). This is the most recent tariff law.

[68] Specific - duties expressed as a given amount of a foreign currency per unit of weight. U.S. Tariff Commission, Iron and Steel, Report No. 125, Second Series (Washington, 1938), p. 415.

or additional duties.

Originally the tariff law was intended as a fiscal agent and as a means of protecting domestic industries.[69] It contributed 30 to 40 per cent of the total revenue between 1925 and 1940. A relatively large percentage of the total imports subject to duty is indicative of this fact.[70] Although the law has never been modified in its entirety, many changes have been made in single items. One writer has likened it to a "patchquilt." Even today it is primarily a revenue measure, although the protective aspects for certain industries have become apparent.

Partly because of this protective program, the ratio of imports of manufactured articles to total consumption of such goods has declined from approximately 40 per cent in 1910-1913 to 20 per cent in 1939.[71]

On the other hand, duties levied on a fixed tariff value[72] rather than on the real value[73] results in a chaotic basis for calculation, since the discrepancy between the real import value and the fictitious tariff appraisal has oscillated, over a period of 40 years, between a low of 1.3 per cent and a high of 201.5 per cent above the appraisal value. Some goods are overtaxed by the tariff, some undertaxed.[74]

---

[69] It must be remembered that duties designed to yield revenue do not give much protection. Revenue depends on the fact that goods continue to come in and to pay the duty; protection causes goods to be kept out. Carter and Dodge, op. cit., p. 168.

[70] About 75 per cent of the total imports were subject to duty between 1913 and 1934. V. L. Phelps, The International Economic Position of Argentina (Philadelphia: University of Pennsylvania Press, 1938), p. 202.

[71] U.S. Tariff Commission, op. cit., p. 9.

[72] Tariff value - arbitrary valuations used for the assessment of customs duties. U. S. Tariff Commission, Supra, p. 13.

[73] Real value - represents an attempt to adjust tariff valuations of groups of commodities at regular intervals to approximate market values. Ibid.

[74] Felix Weil, Argentine Riddle (New York: John Day Co., 1944), p. 141.

Another aspect of the tariff law, indicative of the trend toward rigid government control of imports, has been the power vested in the hands of the Executive. He may increase duties by as much as one-half, or levy new duties, up to a maximum of 15 per cent ad valorem on duty-free goods, for imports from countries which do not grant most-favored-nation treatment to Argentine products. Likewise, he may reduce the minimum import duties, without legislative approval, in return for equivalent concessions in commercial agreements. He may also increase duties to prevent "dumping," these duties are reviewed by the legislative body, however.[75]

Exchange control.--Exchange control, which was officially adopted in October, 1931 has been the most important official control of foreign exchange transactions in Argentina. All imports and exports were placed under the control of the Exchange Control Bureau, which in turn was controlled by the Ministry of Finance. The purchase and sale of all foreign exchange had to be made through authorized banks at rates fixed by the control authorities. Exchange permits were required before importers could obtain drafts with which to pay for goods purchased abroad.[76] Exchange permits were issued principally on a bilateral-balancing basis; permits were granted for imports from each foreign country in proportion to the

---

[75]U.S. Tariff Commission, op. cit., pp. 12-13.

[76]After the importer has cleared the merchandise through the customs, and after the import duties are paid, the customs official delivers to him an exchange permit - Form No. 105 - for merchandise to be paid for at the rate of 17 paper pesos to the pound sterling, or Form No. 159 for merchandise to be paid for at the rate of 15 paper pesos to the pound sterling. Permits are valid for 45 days after customs duties are paid.....If permit is not used for purchasing official exchange, it must be returned to the authorities because shipments are usually paid for in Argentine pesos, and exchange is granted after the merchandise is cleared and passed through the customs. Exchange Conditions in Latin America (Chicago: First National Bank, Foreign Banking Department, February 1, 1941), pp. 1-2.

aggregate exchange available as a result of that country's purchases of Argentine products. The official selling rates, the rates charged importers who had obtained permits, were lower than the free-market rates.[77]

Importers could import commodities without going through the channels of the Exchange Control Board, but they were penalized in so doing by having to pay a surtax. By 1935 the exchange surtax on imports for which no prior exchange permit had been granted was reduced to from 20 to 10 per cent.

In November of 1935 the prior-exchange-permit system was extended to all imports, regardless of whether the exchange could be purchased at the lower official rates or had to be obtained on the free market. In effect, exchange permits became import permits, the allocation to each country being dependent on the amount of exchange created by exports to that country. Depending on the type of goods to be imported and the country from which the goods were to be obtained, the permits specified either that the holder was entitled to buy at the favorable official rate or that he had to bid in the free market.[78]

In August 1939, the free exchange market was eliminated for imports. Two official exchange rates were established: Rate A, which conformed to the former official rate, and Rate B, to the former free market rate. Foreign drafts were released to importers either at official A Rate (17 pesos to the pound sterling), or at official B Rate (20 pesos to the pound sterling) according to the type of goods imported. Subsequently, these rates were dropped to 15 and 17, respectively. Whether or not exchange was granted at either of these two official rates depended not only on the type

---

[77]U.S. Tariff Commission, op. cit., pp. 14-16, passim.

[78]Ibid., pp. 16-17.

of commodity imported, but also on the country of origin.[79] The most favorable exchange rates were usually allocated for the purchase of commodities from countries with which Argentina had an export balance of trade.

The treatment to which imports were subjected was determined by the action of the Argentine Government on the basis of published lists indicating the exchange and quota treatment applicable to each. The lists have been amended from time to time.

"Exchange control has been a defensive mechanism," according to Olsen and Hickman. In summing up the financial and economic maladjustments, along with the nationalistic tendency since 1930, they enumerate a chain of relationships that account in part for the establishment of exchange control. The world price levels declined and markets dwindled - value of exports fell precipitiously - foreign balances became inadequate - heavy losses of gold resulted - ultimate suspension of the gold standard took place - further curtailment of world markets followed - decline in prices continued - European bilateralism grew - and lastly, exchange control was established.[80]

Trend toward self-sufficiency.--Industrialization was also a counterpart of the trend toward agrarian self-sufficiency in Europe, and of the politics of Imperial Colonial preference. Britain adopted a protective tariff policy in 1931 and signed the Ottawa agreements[81] in 1932. Both had repercussions in Argentina. According to Wythe, "It would not be too much to say that the Ottawa conference, more than any other single development,

---

[79]U.S. Tariff Commission, op. cit., p. 17.

[80]P. H. Olsen and C. A. Hickman, Pan American Economics (New York: John Wiley and Sons, 1943), p. 321.

[81]The Ottawa agreements narrowed the British market for South American meats and other products. This policy of imperial preference caused much concern in Argentina as to the future of their meat trade. Wythe, op. cit., p. 6.

caused the reorientation of Argentine economic policy."[52]

Establishment of foreign branch plants.--The activities of foreign branch plants and public utility companies became apparent. Exchange was needed to purchase parts, supplies, and equipment abroad and to remit earnings. Because of the difficulty of obtaining exchange, huge balances in national currency accumulated. Often public utilities were forced to bring in new capital, for exchange was not forthcoming even to cover the import of necessary spare parts. The result was that those concerns had to use their plentiful supply of pesos for purchase locally and thus avoid importations for which exchange was needed. Local concerns were urged to start to manufacture the needed items.[53]

With the depreciation of the peso and the high protective tariff foreign manufacturers were anxious to establish branch factories in Argentina. In 1935 and 1939 factories for the manufacture of cast glass, asbestos, cement, sulphuric acid, enamels, elastic thread and others, were being erected in the Argentine by the United States, United Kingdom and Continental interests, acting separately or in combination.

Argentine industry in expansive phase.--The depression was less acute and of shorter duration in Argentina than in the majority of other countries. Unemployment was relatively low. Neither stock exchange crisis nor bank closures occurred. At no time were the products destined for export held up. The general level of prices, with the exception of landed property and of export products, fell only slightly. Within the latter years it was possible to balance the National Budget as well as those for most of the provinces. The country was able to pay on her foreign debt in addition

---

[52]Ibid., p. 115.

[53]Phelps, op. cit.

to increasing and perfecting the manufactural products on a progressive scale.[84]

The depression found some countries with ample construction equipment and other durable goods on hand, the production of which was held up, but the Argentine experienced a scarcity of such needs. In the same way, it found some countries in an industrial superexpansion and the Argentine with an insufficient industry for its own internal requirements. Bunge sums up this condition thus:

> The depression caused by the great war compelled Argentina to concentrate to some extent on herself and to speed up her industrial process which up to that time had been too slow. The country had been dazzled and blinded by the success of the growing foreign trade, on which the whole of its energy was focused, imprudently neglecting the diversity of its production, its manufacturing industries and its home trade. Argentina's vision was directed overseas and her back was turned on the interior..... Two world catastrophies have made the country look to her own house, firstly, the world war and secondly, the great depression.[85]

By 1937 many existing plants expanded and many small-and medium-sized establishments continued to spring up around the Federal Capital.

> Industry moved faster in Argentina than in the United States in the two decades preceding 1938. Between 1914 and 1935 the value of production, exclusive of foodstuffs, increased by about 150 per cent in Argentina, from $290,000,000 to $725,000,000, while the increase in the United States was less than 100 per cent, $19,000,000,000 to $36,000,000,000. In the same period the use of motive power in Argentine industry increased by 275 per cent. In the six years from 1927 to 1933 the value added by industrial elaboration rose from 28 per cent of the total value of national production to 47 per cent.[86]

Argentina experienced perhaps the most prosperous era in her history while many countries of the world were in the depths of depression. The

---

[84] A. E. Bunge, "Nature and Scope of the Argentine Economic Recovery, 1937," Revista de Economia Argentina, XIX, No. 230 (Agosto, 1937), 221.

[85] Bunge, op. cit., p. 231.

[86] "South American IV: Argentina," Fortune, 18, No. 1 (July, 1938), 104.

world slump enabled the Nation to consolidate her manufactural progress and establish a firm industrial structure.

Recent manufacturing tendencies.--Argentina has realized a great industrial effort from 1939 to 1943. Invested capital in industry amounted to 5.500.000.000 pesos. The industrialization of Argentina in these years can be seen by a comparison of groups of products exported. Between these years there was a drop of 33 per cent in the value of raw materials exported, but an increase of 92 per cent in primary industrial products, an increase of 547 per cent in semimanufactures and an increase of 1.446 per cent in finished products exported.[87]

National industry was able to supply most of the Argentine needs and also to satisfy some of the demands of neighboring countries. Argentina was building up a reputation as an exporter of industrial products. By 1943 Argentine manufacturing goods amounted to about one-fifth of the total exports (Table IX).

The value of production increased about 10 per cent in the short period from 1942 to 1943. The physical volume of production, moreover, showed only an augmentation of about 5.5 per cent between 1935 and 1942 (Fig. 1).

Measures taken by the Argentine Government up to the end of World War II implied nothing but what amounted to a recognition of these circumstances. Industrialization received a huge stimulus in June 4, 1943 when the Government announced that the country's defense would require continued industrialization supported by the Government.[88] Abarca expresses this view as follows:

---

[87]Mariano Abarca. La Industrialización de la Argentina (Buenos Aires, 1944), pp. 17-18.

[88]W. P. Schmok (ed.), Argentina Financial Service, Argentina at the Turn of 1944/45: A Business Survey (Buenos Aires 1945), pp. 41-47.

> The stoppage of Argentine industrialization or its diminution, would signify the unemployment of several hundred thousand persons who have a level of living superior to those occupied in agriculture and pastoral work, and therefore, a diminution of the internal market for the products of these industries.
>
> From the financial point of view, in the last years the taxes on the national work represented the largest proportion of the budget of the Nation and the provinces, the importance of the customhouse rent having practically disappeared as a source of return.

Government support of industry was of two kinds; direct - to furnish investment capital and to nationalize industry through such measures as decentralization and control; and indirect - to raise the import duties and supply foreign exchange in order to foster certain industries and to secure international cooperation through the establishment of a Southern Customs Union.

Bank for industrial credit.-The Argentine Bank for Industrial Credit started operations on September 1, 1944. Its main purpose was to grant long-term investment credits and medium-term credits for the purchase of raw materials. It was also authorized to buy and sell commercial notes, as well as bonds, thus making it a means for supporting industrial plants in case of need, through purchasing their I.O.U's, or mortgages in any form.[89] The President of the Bank, in a speech before the Union Industrial Argentina made it plain that the State would have to supply the funds which the Bank would need in order to foster industries indispensable to the country.

Nationalization of industry.-National coordination was yet another matter. A general Census is now being taken, the first in 30 years, and as soon as data are available a 5-year plan of economic development will be revealed. As far as economics is concerned such a plan will become the hub around which the wheel of full production will be built. Moreover, a policy of production and industrialization for defense is bound to achieve a percentage-wise much higher output in a new country than in the

---

[89] Schunk, op. cit.

old industrialised nations. Argentine economic optimism becomes fully understandable. Until the Census results are forthcoming the Government decided on several emergency measures.

By the Decree of July 6, 1944 the old 1866 expropriation law was changed in such a way as to give the State authority to expropriate any private, municipal, or provincial property which it needed.

Concerning stocks of strategic raw materials the Government passed several Decrees. The one of January 15, 1944 required quarterly sworn statements on stocks of strategic raw materials, such as special steels and non-ferrous metals. That of October 30, 1944 made all critical materials subject to permanent control of the National Rationing Council. When such materials were imported for special purposes, they could not be used for other purposes. The government completed this Decree on November 8, 1944 by a reglamentation which authorised the State Secretariat of Industry and Trade to remove officers of any company that no longer acted in the best interests of the Nation. The officers were to be replaced by an interventor and the government was to purchase the plant, which could then be sold or rented only to Argentines.

Plans for defense industries involved: 1.) production of steel and cement, 2.) production of substitute fuel and development of hydro-electric power, 3.) production of synthetic rubber and chemical products and 4.) intensification of mining activities. Industrial centers, other than Buenos Aires were to be created for defense reasons in the hinterland, especially in Córdoba, Rosario and in the Andean regions. Such a decentralization of industry would entail, at a great expense, a reorientation of the national traffic system since the present lines all focus on Buenos Aires. It would, moreover, counteract the heavy drain of financial and human resources into Buenos Aires.

The indirect measures taken by the Argentine Government to foster industry are significant. The next few paragraphs concerning Argentina's commercial policy will complete the picture that was presented earlier in this Chapter.

Tariff.--By 1941, of the 17 nations with which Argentina had bilateral agreements, 5 were at war (Great Britain, Germany, Italy, Hungary and Rumania), 10 were occupied by Germany (Austria, Belgium, Czechoslovakia, Denmark, Finland, France, Greece, Lithuania, Netherlands and Poland), and shipping had virtually ceased with the other 2 (Spain and Switzerland). With the closing of the leading export markets and the limitation on imports due to shipping shortages and other causes, the importation of strategic industrial materials had greatly decreased. Many changes in the tariff had to do with the granting of favorable treatment to selected imports.

By an Executive Decree June 6, 1944 the powers of the Executive in regulating the tariff were greatly extended. The new Decree, definitely protective in character, authorized the Executive to increase import duties in order to foster industrial expansion and to prevent "dumping." The measure had three objectives: 1.) to shield industries created or expanded during the war from excessive competition during the post-war period, 2.) to foster new industries, and 3.) to stimulate further the industrialization of the country.[90] The Executive could impose additional duties of as much as 50 per cent on the existing rates in order to protect Argentine manufacturing industries from foreign competition. The increased duties could be applied when the c.i.f. value of imported products, plus the customs duties and other charges, was lower than the

---

[90] U.S. Tariff Commission, op. cit., p. 29.

domestic cost of production.[91] Manufacturing industries that might receive such aid were those fabricating Argentine raw materials for home consumption, or those consuming raw materials of foreign origin to produce goods of prime necessities. When reduced rates were granted, manufactures became subject to rather comprehensive supervision by the Government, especially concerning operating policies and costs.[92]

The Executive could also place quotas on imported commodities competing with those of domestic manufacture, prohibit imports entirely of such goods, or grant subsidies to industries of particular importance to national defense.[93]

In 1941 the tariff laws of Argentina were consolidated in one text. The new schedule was essentially that of 1923 together with the modifications made since then. In that year a Commission for the Study of Evaluations (Comisión Para el Estudio de la Tarifa Avalúos) was created in order to prepare a new schedule of tariff valuations and to modernize it using the nomenclature recommended by the League of Nations. The Committee was expected to complete its work in 1944. It is common

---

[91] In most cases tariff duties are placed on commodities that can be produced in the country levying the duty, but only at a cost greater than that in a foreign country enjoying a comparative advantage in that particular commodity. The tariff reduces this foreign competition and enables the domestic producer to sell his product, because the price of the imported goods is raised by the duty. The extent to which the price is raised and to which domestic production is increased and imports are curtailed depends on the height of the tariff duty, and on the difference between the cost of production in the country levying the duty and that abroad. Tariffs, then, in any country may be said to restrict the importation of goods which can be produced more cheaply abroad, to raise prices to the consumer, and to stimulate the domestic production of goods for which the country lacks comparative advantage. Obviously, a tariff is a barrier to international trade. Carter and Dodge, op. cit., pp. 169-170.

[92] U.S. Tariff Commission, supra.

[93] Ibid., pp. 29-30.

knowledge that the new schedule has been completed, but has not yet become law.[94]

The Five-Year Plan calls for high customs duties in order to protect new industries and prevent dumping. Import quotas will keep prices down when part of the demand must be supplied from abroad. Import permits will prevent "cornering" and will regulate import products. There will be exemptions from customs duties of materials not produced in Argentina, or in insufficient quantities for the manufacture of essential goods or those important for national defense. In cases where local industry produces a small quantity of goods in proportion to consumption, the customs duties will pay the subsidies.[95]

Exchange control.--Exchange control regulations became less rigid after 1940. Argentina found itself unable to spend a portion of the credits received for its export products, except in the country to which the exports were shipped, the balances were not available for purchase on a multilateral basis (blocked sterling accounts checked triangular settlements).[96] Shipping restrictions and the war-time closing of certain sources of imports, forced Argentina to seek new sources of supply.

---

[94]Interview granted by Mr. Guy Castle, Specialist in Argentine Tariff, Office of International Trade, American Republic Division, U.S. Department of Commerce, on January 24, 1947.

[95]Rev. of the River Plate, op. cit., (November 1, 1946), p. 14.

[96]Most of these earlier agreements included either clearing or payments provisions. A clearing agreement in its simplest form provides that the importers of each of the two countries shall pay the cost of their imports from the other country into accounts in their own national currency maintained by an agency selected or established for that purpose. These funds are paid out to those who have exported commodities from the country in question to the other. In payments agreements the exchange is controlled in only one of the two countries; the other maintains a free exchange market. U.S. Tariff Commission. The Foreign Trade of Latin America, Part II, Section I, Argentina (Washington: 1940), p. 17.

chiefly in the Western Hemisphere. Trade agreements since 1939, therefore, have been of a most-favored-nation type, that is, no prohibitions or restrictions were to be imposed by either government with respect to imports from or exports to the other country unless similar prohibitions or restrictions apply to all third countries.

On the basis of the 1940 imports, 85 per cent of the imports from whatever source could enter without limitations, 11 per cent were subject to flexible limitations as to quantity, and less than 4 per cent were temporarily excluded.[97]

After July 1, 1941 prior exchange permits were not required for imports from blocked-currency countries (primarily the United Kingdom where 43.000.000 pounds sterling of blocked exchange had accumulated in the Argentine account by 1943), for imports from neighboring countries, for imports paid for with exchange obtained in the auction market and for essential products obtained from free-currency countries. The Exchange Control Board was also abolished. Foreign exchange transactions were then handled by the Central Bank and the scope of the control was diminished. In 1942 the exchange control regulations were further revised and all imports could enter without restrictions.

The increased prices of exports, especially meat, and the war-time reduction of imports, allowed a more liberal application of exchange regulations because the country held large reserves of gold and foreign exchange. There were virtually no controls at the end of the war.

Exchange rates, according to the Five-Year Plan, will be graduated for imports giving preference to raw materials and semiprocessed goods not produced in sufficient quantities in the country. The same measure

---

[97] Olson and Hickman, op. cit., p. 321.

will be applied to imports of machinery and spares, transport equipment and generating plants not made in the domestic mills. Preferential rates will be applied to Argentine products which are exported in the most highly processed or manufactured state. The preference will be correspondingly less as the degree of processing is less.[98]

The reestablishing of strict exchange control is evidenced by the issuing of Circular No. 637 by the Central Bank on January 20, 1947 (to become effective 3 months later) placing everything under a system of prior exchange permits.[99]

Southern Customs Union.-The idea of a planned Southern Customs Union (Union Aduanera del Sud) is by no means new. It dates back many years, but one revived by Bunge first in 1909 and then again in 1940 in his book Una Nueva Argentina.[100] As advocated by Bunge the Union would include Argentina, Bolivia, Chile, Paraguay, Uruguay and perhaps Brazil. This Southern Bloc's bargaining power for future world markets would be superior to that of any one of the nations individually.[101]

Collectively, these countries could be self-sustaining from the point of view of foodstuffs, iron and steel, coal and waterpower. They also have the world monopolies of natural nitrates, iodine and quebracho extract for tannin. Substantial proportions of the world's supply of cereals, meats, flaxseed, wool, coffee, copper and tin are produced in these countries.

The first conference, held in Montevideo in 1941 upon the request of

---

[98] Rev. of the River Plate, op. cit. (November 1, 1946), p. 14.

[99] Interview with Mr. Guy Castle, op. cit.

[100] Bunge, Una Nueva Argentina, op. cit., pp. 279-304.

[101] Weil, op. cit., pp. 184-5.

Argentina, had delegates from Argentina, Brazil, Bolivia, Paraguay and Uruguay, and observers from United States, Chile and Peru. Its purposes were to form a customs union and to improve river transport. The resolutions that were drawn up endorsed a regional customs union and bilateral treaties among the countries.

Negotiations followed. A treaty between Brazil and Paraguay was signed June 1941 and another between Brazil and Argentina in November 1941. This latter pact established the basis for a customs union between Argentina and Brazil. The agreement concerned itself with the duty-free import of new industrial goods for 10 years, the mutual promise not to place new duties on goods now produced on a small scale, and the gradual reduction of duties on each other's major non-competitive goods. It was expected that the new treaty would encourage the flow of goods within the region in addition to facilitating industrialization by making a larger unified Argentine-Brazilian market.[102] Economically, the two countries are complementary. In November 1943 a treaty between Argentina and Paraguay was terminated.[103]

The Southern Block seems definitely in the making. Witness Argentina's aid to Paraguay in 1942 by buying up 20.200.000 pesos worth of pound sterling credits derived from Paraguayan exports to Britain, for which Britain could not deliver the goods.[104]

On December 13, 1946 a trade and financial agreement was completed with Chile. The agreement was designed to promote trade between the two countries by the establishment of a virtual customs union and by giving Argentina freer access to Chilean coal and iron. The agreement provides

---

[102] Olson and Hickman, op. cit., pp. 316-18.

[103] Weil, op. cit., p. 155.

[104] Ibid., p. 156.

that Argentina shall invest up to 300.000.000 Argentine pesos in developing Chile's mineral and other resources; an equal amount to be loaned to Chile for financing a public works program; a sum of 100.000.000 pesos to be loaned to Chile to cover Chile's anticipated unfavorable trade balance over the next two years.[105]

Commenting on this treaty an editorial in The Washington Evening Star had the following to say:

> The terms of this agreement interlock the economies of the two countries so closely that it is hard to see how they can ever again be unscrambled. This is because, from the strictly economic viewpoint, Argentina and Chile logically complement each other. Argentina has immense agricultural wealth, producing big surpluses of cereals and livestock products; whereas Chile, which is geographically the narrow shelf between the Andes Mountains and the Pacific Ocean, has so little arable land that it is not self-feeding. However, Chile possesses mineral wealth that Argentina lacks, including newly discovered oil fields. What, therefore, could economically be more logical than the welding of these supplementary economies into an integrated whole?
>
> The idea itself is not new. It has been proposed by economists in both countries for many years.....The chief source of its (Chile's) former prosperity was undermined over thirty years ago when German chemists produced synthetic nitrates which undercut Chile's natural nitrate monopoly, while the economic aftermath of World War II has further jeopardized its situation. Under these circumstances, the lure of big Argentine credits for foodstuffs and public works, especially in transportation, proved irresistible.
>
> The gain to Argentina is obvious. President Perón has now acquired most of the products he lacks to build up a well-rounded and relatively self-sufficient economy, including a free port on the Pacific. It likewise gives him an economic leverage on the smaller nations of South America, especially Bolivia, Paraguay and Uruguay, which can be used to bring them into his projected economic-political bloc.....[106]

Theoretically, the participating countries in a customs union are enabled to enjoy more fully the benefits of mass production and the

---

[105] Foreign Commerce Weekly, XXVI, No. 1 (January 4, 1947), p. 10.

[106] The Evening Star (Washington, D.C.) December 28, 1946.

division of labor, which in turn produce a greater real income per capita. This means that the increase in trade between its members will probably be greater than any decrease in trade with the outside world, and that the sum total of trade will have been augmented considerably. It could also be expected that the increased purchasing power of the group resulting from the economic benefits of the union will, in the long run, increase trade with outsiders.

There are certain specific economic criteria which should be applied to proposed customs unions.[107] First, the resources and transportation facilities of the areas concerned should provide reasonable assurance that, as a result of the customs union, there will develop a more economic location of industries and a more specialized production than the member countries could achieve separately. Only if this were the case would there be assurance of a generally increased purchasing power for their populations. Second, the attainment of a full customs union should be definitely scheduled for achievement within a fixed and reasonably short period of years. It would be essential to establish a predetermined program in the signatory countries of reducing internal duties and other trade restrictions until they are finally eliminated. And third, the tariffs of the union should not on the whole be higher than the general average level of the tariff previously applied in the constituent areas, nor should other regulations of trade be more restrictive.

In the post-war period small nations will want a strong security organization and lower trade barriers in the great markets of the world, but they may also seek protection within the framework of larger economic

---

[107] H. P. Whidden, Preferences and Discriminations in International Trade (New York: The Committee on International Economic Policy, 1945), pp. 10-11.

units. They will hope to attain both political and economic advantages in closer association with their neighbors. In South America, the Argentine-sponsored movement for a customs union may result, not in formation of a genuine customs union, but in a proposal for a regional preferential system.[108]

While there may be economic justification for most customs unions, the same cannot be said for most regional preferences. With preferences there is a definite presumption that they will divert and restrict, rather than promote, international trade. For their tendency is almost always to perpetuate high-cost production within the area involved, at the expense of outsiders, while no significant expansion in production takes place along economic lines. A customs union based on sound principles will benefit other countries as well as its members by increasing purchasing power through more efficient production.[109]

Trade Promotion Corporation.-The Corporación para la Promoción del Intercambio was organized April 1941 upon the suggestion of the Central Bank to promote the sale of non-regular exports, that is, articles formerly not exported or exported only in small quantities. Their purpose was to build new export markets. They had offices in the United States and several of the Latin American countries. Other activities of the Corporation consisted of the establishing of export standards, organizing trade promotion centers, collecting statistical data, and employing technical specialists in an advisory capacity. It has sponsored surveys, as for example, that of the Armour Research Foundation, and made

---

[108] Whidden, op. cit., p. 17.

[109] Ibid., p. 18.

studies of many of the Nation's industries.[110]

In May 28, 1946 an Executive Decree liquidated this privately-owned Trade Promotion Corporation and replaced it with a Government-controlled organization called the National Institute for Foreign Trade Promotion. It was founded to obtain the greatest benefit for all the economic interests of the economy.[111]

Problems facing industrialists.--In short, the expanding industrial production, which began as a means of covering the deficit in purchases abroad, but later served to bring about an increase in exports, together with the building activity (which increased 46.2 per cent from 1937 to 1944) have increased the tempo of economic activity, through the intensive use of labor forces and natural resources. They have gradually brought the country to a state closely approaching full employment.[112]

Problems associated with external dislocations in trade seriously affected Argentine industry, especially from the end of 1942. Shortages in fuel, critical raw materials and capital goods, as well as shipping itself, all presented themselves with increasing intensity as the Second World War lengthened. One saving grace, nevertheless, was the fact that not all the European markets were lost to Argentina at the same time. Since the war enveloped the Continent gradually closing one port after another, Argentina had some time to give thought to the reorientation of her export trade and to look around for new sources of import needs. Her

---

[110] U.S. Tariff Commission, Economic Controls and Commercial Policy in Argentina, op. cit., pp. 32-33.

[111] "Further Changes in the Economic and Financial Structure of Argentina," Bulletin of the Pan American Union (October, 1946), p. 59.

[112] Banco Central de la República Argentina, op. cit., Tenth Financial Period, 1944 (Buenos Aires: 1945), p. 2.

economy was more diversified than during the First World War and was better able to withstand temporary shifts.

Other problems facing the industrialists, still unsolved, were the relative inadequacy of the supply of technicians, the great need for the development of hydroelectric power, the dwindling supply of labor due to the stoppage of immigration, and the limited scope of the domestic market due to the small total population of the country.

Shortages of fuel were partly overcome by the use of substitutes. Transportation equipment had to be used to the limit of its capacity. This was also true of industrial machinery. Replacements were needed in both of these lines. Local machine industries tried to meet the most urgent requirements of the plants in the matter of replacements and plant expansion, but their efforts were wholly inadequate. Argentina was able to purchase 16 Italian ships that had been idle in her ports since Italy entered the war. In 1943, she was able to add 3 French ships and 2 German ships to this number. This merchant marine was utilized primarily for furthering trade relations with other American nations.[113]

Foreign purchases of meat, cereals and certain strategic minerals at high prices were more than sufficient to overcome not only the economic effects of the shortages of some of the raw materials, but also the financial limitations of the grain purchasing activities and the public works construction of the national government.[114]

---

[113] "Argentina's Merchant Marine." Bulletin of the Pan American Union, 75 (February, 1941), 62-64.

[114] When the quantity of goods which are exchanged diminishes without a reduction in the amount of money in circulation, or in the means of payment, the price of these goods inevitably rises. In other words, demand exceeds supply. As the Argentine Government began to spend large sums on public works and to purchase grain from the farmers a new purchasing power conducive to a rise in prices was injected into the economy.

Domestic demand for cheap consumers' goods remained high. Manufactured articles trickled in from abroad in much smaller quantities than during World War I. The import trade of all Latin American countries was likewise greatly curtailed. Each nation was building up capital surpluses from sales abroad of critical and strategic war materials, and at the same time, experiencing shortages of the necessities of life. Abnormal conditions prevailed throughout the world. Argentina remained neutral. A war-time economy has, practically speaking, not existed in Argentina. With these facts placed well before an alert people, industrialization was bound to gain momentum.

Post-war rehabilitation always moves slowly. Those industries which have proven themselves to be economically sound will continue on. While it is undoubtedly true that costs of production have risen in the last few years, the general rise in the prices of raw materials and fuel, the rise in wages and the advance in social legislation, they can be reduced considerably with time as more technicians are trained for work in the industries and as the worn-out machines can be replaced with new capital equipment. Surely the price of manufactured goods can be reduced with time to a level as low as, if not lower than, that of the European product, and thus enable the Argentine producer to compete successfully in the Latin American market with the European manufacturer, more specifically, the Continental producer. The freight rates to the Latin American markets will be small. The Argentine industrialist will also have the advantage of knowing the psychology of the Latin American consumer better than the European industrialist.

One significant truth about the great industrial growth in Argentina during the last war must be remembered, namely, that industrial expansion has taken place chiefly in the branches of industry where it has already

proven to be economically practicable. Some new manufactures have been developed, but the major advances were attained by industries that increased their output through making more intensive use of their capital goods or by enlarging the already-existing plants. The country has grown and has improved its economic structure, which is now better balanced. "From this fact and from a proper appraisal of its economic and human resources, there should be born an attitude of prudent confidence in facing the uncertainties of the future."[115]

---

[115] Banco Central de la República Argentina, op. cit., p. 21.

CHAPTER II

GEOGRAPHIC RESOURCES AND ECONOMIC FACTORS CONDUCIVE TO IRON AND STEEL MANUFACTURING IN ARGENTINA

Argentina has serious intentions of developing further the Nation's iron and steel industry. Though small in scale, the industry has grown rapidly over the past decade, and is expected to register a much greater advance within the next five years.

Argentine economists are well aware of the significance of iron and steel manufacturing as a basic industry upon which modern industrialization depends. The leading industrial nations today, the United States and the United Kingdom, have already reached the most advanced stages of iron and steel fabrication. Further progress in these countries awaits technical improvements revealed through industrial research. Moreover, those nations of the world desiring to diversify their economies through industrialization, and thus increase employment and the standard of living, are evaluating their resources, both human and natural, for purposes of initiating iron and steel industries. Australia, India, Brazil, Colombia, Mexico and Argentina are examples of nations that have established iron and steel mills, only in the past few years, within the confines of their territories. Other projects, still in the blueprint stage, are being planned by Chile and Peru.

Steel is the heart of the modern industrial system. Low-priced steel is essential to commercial competition, and the aggressive political policies of certain nations before our last world conflict compelled them to outline spheres of influence from which the essential raw materials could be drawn.

The role played by ferrous metals in industry is of greater importance

than that of all other metals combined. Iron and steel are the most adaptable of metals because their varying mechanical and chemical properties make them suitable for many kinds of uses. The expanding and diversified use of carbon and alloy steel is one of the significant industrial developments of the present century.[1]

Moreover, there is no adequate substitute for iron and steel products. Some machines might be made of wood, but would be costly and short-lived. On the other hand, machines are made of steel because it is the most efficient and cheapest of all the metals from which they could be made. Under special conditions other materials may be substituted for a limited amount of steel, and one alloy steel may be substituted for another with similar properties, but with an increase in cost, and perhaps an addition in weight.[2]

The iron and steel industry is considered, therefore, basic to other industries inasmuch as its fabricated products are consumed by such widely diversified industries as transportation, communication, construction, mining, and even agriculture.

Whether or not a nation is able to establish an economic iron and steel industry rests on the premise that it is able to assemble the necessary raw materials and fabricate them at costs low enough to permit the consumer to satisfy his economic needs and thus raise his level of living.[3]

---

[1]U.S. Tariff Commission, Rpt. No. 125, op. cit., p. 33.

[2]T. S. Lovering, Minerals in World Affairs (New York: Prentice-Hall, 1943), p. 173.

[3]Level of living refers to the things that, on the basis of their income, people can actually have. Standard of living, on the other hand, is usually taken to mean the things that people want, or feel that they must have, or may reasonably expect to have.

This chapter will discuss the structure of the modern iron and steel industry and the nature of the iron and steel industry of Argentina.

Structure of the Modern Iron and Steel Industry

The iron and steel industry, as developed in Western Europe and Northeastern United States, is generally taken to include all the stages from the mining of the iron ore, through the intermediary stages of smelting the iron ore, making iron castings and steel, to the final stages of rolling, forging, or pressing the steel ingots into semifinished and finished products. As such, it is a vertically and horizontally integrated industry.[4] Vertical integration implies that large companies own and operate sources of raw materials, transportation facilities, and mills for fabricating capital and consumer goods, while horizontal integration refers to the widely scattered geographical assets that may be owned by a single, large concern.[5] Integration has been largely the result of the magnitude of the operations necessary for economical production, the concentration of high-grade iron ore deposits, as those of the Lake Superior and Ruhr regions, the geographic concentration of good

---

[4]There are three other categories of steel mills of lesser magnitude than the integrated concerns. These are: 1.) semi-integrated companies which make no pig iron, and therefore buy rather than make the basic metal and begin operations with the manufacture of steel, 2.) non-integrated companies which make no iron or steel, but purchase steel and begin their operations with the rolling of steel, and 3.) merchant blast furnaces which produce pig iron that they sell to semiintegrated companies and to iron and steel foundries. E. B. Alderfer and H. E. Michl, Economics of American Industry (N.Y.: McGraw-Hill Co., 1942), Ch. II.

The Argentine iron and steel industry is an example of the semi-integrated category of steel making.

[5]There were 15 integrated concerns in the United States in 1938 that controlled 89 per cent of the pig iron capacity, 91 per cent of the steel capacity, and 85 per cent of the finished hot-rolled product capacity. Alderfer and Michl, op. cit.

metallurgical coal, as in the Cumberland-Alleghany Plateau of the United States and in the Midlands of Great Britain, and the large quantities of raw materials, of low unit cost, required by steel mills.

To be sure, one of the most significant characteristics of the iron and steel industry today is the large scale of the operations. Effecting a continuous flow of raw materials through the various stages of fabrication without permitting cooling to take place, results in economies of fuel, power, and labor. The Inland Steel Corporation at Gary, Indiana,[6] is, perhaps, one of the largest and most modern mills of its kind in the United States. Operations are continuous throughout the mill from one end to the other, starting with the smelting of the iron ore and ending with the finished products ready for shipment.

Capital investments in making steel mills are naturally large. For example, on an average, according to government estimates, there is a capital investment of from $15.000.000 to $1.900.000.000 in an integrated firm.[7] More specifically, according to estimates made by the U.S. Tariff Commission, an average blast furnace costs about $2.500.000, an open-hearth furnace about $500.000, and a modern continuous mill for the manufacture of wide hot- and cold-rolled sheets and strips approximately $25.000.000.[8]

Another outstanding characteristic of the modern iron and steel

---

[6]The Inland Steel Company is the 5th largest in the United States and 2nd largest in the Chicago district. Operations are completely integrated, and production includes virtually all kinds of rolled and finished steel except wire and pipe. Postwar Outlook for the Steel Industry (N.Y.: E. W. Axe and Co., 1946), p. 52.

[7]The semiintegrated industry has a capital investment from $10.000.000 to $23.000.000; the nonintegrated from $1.250.000 to $2.000.000; and the merchant blast furnace about $4.500.000. Alderfer and Michl, op. cit.

[8]U.S. Tariff Commission, op. cit., p. 86.

industry is found in the oft-repeated statement that, "Steel-ingot production is one of the widely used indices of industrial activity."[9] In other words, there is to be found a close relationship between the volume of steel ingots produced and the rise and fall in market demand. Precisely, what does this mean? The explanation is quite simple. The steel industry's primary function is to supply products which find sale in the capital-goods market. Other industries depend on the iron and steel industry for capital goods to replace worn-out equipment, or to expand their plants during the upward swing in the business cycle. In order that the steel industry may supply the capital goods in demand, it must first increase the output of ingots, the industrial raw material for the rolling and finishing mills. Conversely, when there is a slump in business, capital goods, because they are durable, are not replaced, nor are plants enlarged because the market demand for their consumer goods has fallen off. This downward momentum produces a similar tendency in the production of steel ingots. The steel mill, being unable to maintain its normal rate of production because of the general slump in business, decreases the output of steel ingots. It may be readily deduced that the steel industry has wider swings in the business cycle than industry in general.[10] Earnings rise during times of general prosperity, and become substantial deficits during periods of depression.[11]

All the leading steel-producing nations have access to iron ore and metallurgical coal. Certain nations have surpluses of ore for export, as for example France, Spain, and Sweden. Still other nations have

---

[9] Carter and Dodge, op. cit., p. 432.

[10] Alderfer and Michl, op. cit.

[11] U.S. Tariff Commission, op. cit., p. 100.

deficiencies of ore and must rely on imports, as Japan, Italy, Germany and Great Britain. Among the principal producing countries most nearly self-sufficient in all the raw materials used in steel production are the United States and the Soviet Union.[12] Since the first World War the use of scrap iron and steel along with pig iron, especially in the open-hearth furnace, has caused a dispersion of the historically-concentrated iron and steel industries of the world. This practice has given countries deficient in the primary raw materials a chance to develop an industry. Japan, Italy and Argentina are countries illustrating the erection of steel plants based largely on ferrous scrap.

The leading iron and steel manufacturing nations also have a wide and diversified market. This is one of the major factors contributing to large-scale operations.[13] Only the assurance that there is a well-informed public, with sufficient purchasing power to consume the many units of assembly-line operations, will keep those large plants functioning with their costs of production considerably less than smaller firms could realize. The disadvantage, however, manifests itself when quasi-monopolistic tendencies, by those desiring greater profits, are at work to "corner" the market, and to raise the price of consumer goods.

The labor supply in these leading iron and steel manufacturing nations has been adequately trained. Undoubtedly the advantages of an early start gave labor a chance to develop the necessary skills, and to experiment with technical improvements within the industry. One of the

---

[12] Ibid., p. 5.

[13] The diseconomies of large-scale operations are likely to make optimum firm size small in industries where the products are complex, vary greatly in design and are for a small specialized group of consumers. On the other hand, highly standardized products involve assembly-line operations and are subject to large-scale operations. U.S. National Resources Planning Board, op. cit., p. 207.

biggest problems to be faced in launching a program for heavy industry is the lack of skilled workers and technicians capable of carrying out the necessary operations effectively. Research laboratories are subsidiary to any such program. Scientific training in the College and University also adds to the pool of available technicians and administrators for industry.

Free enterprise and free trade are lasting aspects of a successful iron and steel industry. In the United States it has been proven that greater production and profits are realized from the workings of the old law of supply and demand than from government operation of plants. Industries that are shielded by high tariff walls, aided by government subsidies, or even run under government supervision and control will scarcely be able to survive the era of free international trade and competition advocated by some of our world leaders at the present time.[14]

By way of summary, then, the modern iron and steel industry can best be characterized as being one of vertical integration and large-scale operations, by having most of the primary raw materials and essential labor supply within accessible distances, and of depending on a wide and diversified market in a freely-competitive society.

This résumé has been offered primarily to furnish a basis for comparing the status of the iron and steel industry, as of 1941, in Argentina with that in countries where the industry has reached maturity. It should also be helpful in singling out the problems to be faced by a Nation, such as Argentina, that hopes to build up an industry of much

---

[14] World-wide negotiations for increased freedom in international commerce are in the offing for the international conferences which are to be resumed in April, 1947 at Geneva, Switzerland. "U.S. Program for Freer Trade Hits Snags at Home and Abroad," World Report, Vol. 2, No. 2 (January 14, 1947), 16.

greater proportions than it now has. And finally, it should aid in suggesting the steps necessary for the evolution of an economic iron and steel industry in a Nation, other things being equal.

Nature of the Argentine Iron and Steel Industry

Iron and steel manufacturing, as used in this dissertation, has been defined statistically on the basis of: 1.) the raw materials used, and 2.) the nature of the articles fabricated. More specifically, if the subcategory of "Metals and Their Manufactures," as delineated in Estadistica Industrial de 1941, utilized only very small quantities of iron in proportion to other metalliferous raw materials, the category was deleted. Also, those subcategories that fabricated articles not classified as either primary, semifinished or finished iron and steel products, according to the enumerations in the 16th Census of the United States, Manufactures 1939, were likewise eliminated. In short, iron and steel manufacturing has been statistically defined to include only those fabricated products which utilized among their raw materials, large quantities of ferrous industrial raw materials, and manufactured products generally recognized as made in iron and steel mills.

Production of Argentine iron and steel industry in 1941.-In 1941, there were 1.005 iron and steel establishments, employing 46.836 workers (obreros y empleados) in Argentina. Wages and salaries of these workers amounted to 66.265.000 pesos. The cost of raw materials used was 179.035.000 pesos, of which 136.119.000, or 76 per cent, were of foreign origin. Almost 7.000.000 pesos were spent on fuels and lubricants. For the industry as a whole, the value of production totaled 294.264.000 pesos, and the value added by manufacture was 107.361.000 pesos (Table XI).

TABLE XI

SUMMARY OF IRON AND STEEL MANUFACTURING IN ARGENTINA
For the Years 1937, 1939, 1941 and 1942*

Item	1937	1939	1941	1942	% Increase 1941/1937
No. of establishments	899	983	1.005	975	20.5
Total workers	37.875	39.634	46.836	47.222	19.1
Salaried workers	2.853	2.235	4.213	4.536	32.3
Wage earners	35.022	36.399	42.623	42.686	17.8
Primary motors, h.p.	5.914	6.256	6.008	6.934	1.5
	Thousands of Pesos				
Wages & Salaries	51.369	57.538	66.265	70.064	22.5
Total raw materials used	117.527	135.023	179.035	196.290	34.3
National	21.235	26.919	42.916	**	50.5
Foreign	96.292	108.104	136.119	**	29.0
Fuels & lubricants used	3.341	3.534	6.829	9.344	51.1
Value of production	204.720	228.569	296.264	326.700	30.9
Value added by mfr.	80.709	87.780	107.361	117.764	24.9

*Estadística Industrial de 1941, op. cit., pp. 94-97, and Estadística Industrial de la República Argentina, 1942, op. cit., pp. 47-49.

**No data available.

If all the establishments classified in Estadística Industrial de 1941 had been taken into consideration, there would have been a total of 3.163 establishments engaged in some phase of iron and steel manufacturing. Only one-third of the establishments employed more than 5 workers, while the other two-thirds fell under the category of small shops, and are not included in the present delineation of iron and steel manufacturing.

From the point of view of the classification of the iron and steel establishments according to the value of their production[15] one learns that 423, or a little over 40 per cent, of the total number of establishments registered production valued between 25.001 and 100.000 pesos, and 270 more, or 27 per cent, belonged to the group having production valued between 100.001 and 500.000 pesos. There were fewer plants, 202 in number, in the group whose value of production was 25.000 pesos and less, but the fewest number of establishments, only 110, were in the group where the value of production was greatest, more than 500.000 pesos.

In addition, one may further note that the industries with the largest value of production not only employed the largest number of workers of the total occupied workers, but also realised the greatest total value of production.

A just conclusion to draw from the data, thus far presented is that there were a great many small plants fabricating some kinds of articles from ferrous industrial raw materials, not included in this study which considers only establishments with 5 or more workers, and a few very large establishments whose value of production amounted to more than two-thirds of the total value of production registered by the entire iron and

---

[15] See Appendix Table 6.

steel industry in 1941. This tendency toward concentration of production by a few large establishments, where economies can be practiced and costs of production are lower than in smaller businesses (because more units can be produced), is one of the advantageous aspects of this relatively new manufactural activity in Argentina.

The production by subcategories of the iron and steel industry in 1941 will now be analyzed. Using as criteria the number of workers, the total wage bill, the value of production, and the value added by manufacture, the first subcategory of iron and steel manufacturing, designated by the heading, "Iron and steel, smelted, rolled, and fabricated into finished products," was, by far, the most important.[16] It employed 37 per cent of the industry's workers, paid out 43 per cent of the total industrial wage bill, contributed 34 per cent to the total value of production, and was responsible for 43 per cent of the value added by manufacture.

This same category of iron and steel manufacturing utilized such raw materials as: iron in black and galvanized sheets, sections, and ingots; scrap iron; zinc ingots, sheets and scrap; steel plates and scrap; bronze plates and scrap; copper plates and scrap; wire; tin; aluminum; babbit metal; and a great number of other raw materials in lesser amounts. It made use of 64 per cent of all the fuels and lubricants consumed by the iron and steel industry, indicating that earlier stages of iron and steel fabrication were represented. A variety of semifinished and finished products were turned out, among which were: iron and steel worked in columns, trusses, windows, framework, platforms for bridges and culverts, sheets and roofs; iron and steel in bars, plates, sections and beams;

---

[16] See Appendix Table 7.

sanitary articles of cast iron; steel smelted or prepared in various forms; barrels; drums; and many other products.

The second ranking category of iron and steel production, on the basis of value of production, is entitled, "Finished products of tin plate, especially containers." Iron, black and galvanized sheets, tin plate, tin, solder, zinc sheets, lead, and paints and varnishes were among the essential raw materials, while the predominant manufactured product was containers of tin plate. These found ready markets in the canning factories of the Nation. This category of the iron and steel industry utilized a greater volume of raw materials, by value, than any of the other sub-groups. These were largely of foreign origin.

The aggregate of these two categories of iron and steel manufacturing amounted to 70 per cent, by value, of all fuels and lubricants consumed by the industry, 60 per cent of the total value of the raw materials utilized, 55 per cent of the industry's employed workers, 60 per cent of the registered value of production, and 60 per cent of the total value added by manufacture.

All the other subcategories of iron and steel manufacturing are diminutive in their contribution to the industrial whole. Construction materials, such as, doors, windows, lattice and shades found employment for 5,702 workers in 268 mills, or an average of 20 workers per plant. Iron sheets, brass sheets, steel, hardware, bolts, nuts, and screws were used in large quantities in the manufacture of the finished products mentioned above. The next category, finished products of iron, with or without other metals, averaged about 30 workers per plant. Iron in sheets, sections and scrap; steel; brass sheets; copper sheets; tin; hardware; wire; pipes; and hoops were the leading raw materials used in these plants to turn out enamelled iron fixtures, sanitary articles of enamelled

iron, tanks, expanded metal, springs and firearms.

Kitchen ranges and heating units constituted the next category, by value of production. There were 47 plants employing a total of 2.030 workers. Kitchen ranges capable of using gas or kerosene made up the largest item of manufacture, by value. Heating units for burning gas, supergas, kerosene, and naptha were also made. Iron sheets, sections and scrap; brass sheets; tin; solder; aluminum; and iron and brass pipes were important raw materials.

The remaining categories of iron and steel manufacturing need little elucidation. Taken together they aggregate only one-fifth of the number of establishments, one-sixth of the total employed workers, and a little more than one-sixth of the total value of production for the industry as a whole.

A careful examination of the various subcategories of iron and steel manufacturing indicates further information relevant to the concentration of production within the industry itself.[17] In each subgroup a few large establishments are responsible for the major part of the production, by value. For example, in the first subgroup, in which the total value of production was 99.435.000 pesos, there were 26 mills that accounted for 86.970.000 pesos of that total value of production, the average mill thus having a production valued at approximately 3.300.000 pesos. And again, in the second subcategory, 35 mills contributed 66.006.000 pesos of the total value of production of 78.930.000 pesos, the production of the average mill being around 2.000.000 pesos.

A general conclusion that may be drawn from this table, then, is that the smelting and rolling of iron and steel, the manufacture of tin

---

[17] See Appendix Table 6.

plates, galvanized iron, wire, bolts, nuts, screws, pipes, wire mesh, vats, and tanks takes place in large plants whose average value of production is more than 1,000,000 pesos. This tendency is in line with modern practice in steel manufacturing.

Growth of the iron and steel industry in Argentina.--There have been a number of small mills, mostly foundries, manufacturing finished iron and steel products since the early twenties. Their number as well as their volume of production has fluctuated widely. Their products had difficulty competing in the domestic market with the importation of products of higher quality from the United Kingdom, and those of less high quality from the Continent of Europe. The few local manufacturers in Buenos Aires were interested only in the finishing stages of steel making, and were favored by the advantages of a concentrated consuming market, and an equally concentrated labor supply. Those same manufacturers, however, were handicapped by the total absence of metallurgical coal and by the lack of knowledge of any known commercial iron ore deposits. They had to depend to a very great extent on the importation of coal and fuel oil, and primary and semifinished ferrous raw materials, which came in principally from Great Britain and Western European countries. The early conclusion was soon reached that the country must depend on imported iron for its requirements, and that an iron and steel industry could not be developed in Argentina on any scale approaching that of other countries which produced pig iron. Some hint was offered as to the possible use of the scrap that was accumulating in the country.[15] At the National Industrial Exhibition held from December 1924 to March 1925, there was put on

---

[15] La Nacion predicted in 1929 that Argentina could develop a metal-working industry of its own based on the residue materials of the country, mostly scrap from the railroad workshops, plus a small output from repair shops and agricultural machinery.

display a number of locally fabricated light iron and steel products, among which were: metallic work of iron, certain motor car accessories (axles, shafts, springs, hub caps, chains, and others), ironmongery, bolts, nuts, screws, and enamelled ware.[19]

Further developments in the iron and steel industry had to await more detailed exploration and exploitation of the metalliferous resources of the country, governmental protection and subsidization, and an increased interest on the part of the consuming public in the lower-quality domestic product.

A somewhat similar description applies to the industry in the early thirties. Argentina depended on steel-producing countries for a large share of its requirements. Foundries, especially associated with the leading railroad companies, continued to increase in number. One of the most important firms, for example, Talleres Metalúrgicos San Martín, "Tamet," S.A., was reduced to working only half capacity in 1933. This company has two plants located in Avellaneda and San Francisco, suburbs of Buenos Aires. One plant, "General Bush," made cast iron, enamelled cast iron sanitary wares, wood screws, bolts and nuts, galvanised iron sheets and miscellaneous foundry products. The other plant, "San Francisco," turned out boilers, drawn and galvanised wire, steel shapes and beams, wire nails, barbed wire, agricultural implements and tools and structural steel.[20]

Another important works was that of the British Structural Steel Company, a subsidiary of Messers. Dorman, Long and Company, Ltd., which specialised in the manufacture of construction materials. In normal times

---

[19] Gt. Britain, Dep't. Overseas Trade, op. cit. (Sept. 1925), p. 58.

[20] This plant was founded in 1909, and had a capital of 6.000.000 pesos in 1933, and 20.000.000 pesos in 1943.

there was an annual consumption in Argentina of galvanized corrugated iron sheets amounting to 100.000 tons. Almost all the galvanizing was done locally in three large factories, namely, the Anglo Argentine Iron Company, Talleres Metalúrgicos San Martin, and John Lysaght and Company, the first and third of which were British. In 1931 the local galvanising plants were almost fully occupied, but by the end of the year following, they were using barely 50 per cent of their capacity.[21]

The rolling of small sizes (8 to 16 cm. deep) of steel joists from remelted scrap kept the local Juan Pinasco works, the largest of the 2 rolling mills in Buenos Aires, very busy during 1934, and there was so much work on hand that new deliveries could not be made in less than 6 weeks from the date of the order. In fabricated steelwork the production was greater than in 1933, due partly to increased Government purchases, especially by the Ministries of War and Public Works. The structural steel fabricating section of Messers. Thyssen's Works, in Buenos Aires, which was closed down in June 1932 for improvements in the factory, was still operating at less than half its full capacity in 1935.[22]

Indicative of the awakening interest in Argentine iron and steel industry was the creation under the Ministry of Agriculture, of the Comisión de Fomento de las Industrias Metalúrgica y Siderúrgica (Bureau of Industrial Metallurgy for Iron and Steel), July 17, 1936. Its purposes were multifold: to make an exhaustive geological study of the country's iron deposits, especially those of the upper Paraná River area, to study tariffs applicable to the iron and steel products which enter free of duty,

---

[21] Gt. Britain, Dep't. of Overseas Trade, op. cit. (January 31, 1933), p. 123.

[22] Gt. Britain, Department of Overseas Trade, March 1935, op. cit., (1935), p. 145.

to study metallurgical development in the manufacture of iron and steel, and to encourage the manufacture of the same.[23]

A government subsidised and controlled rolling mill was formed, La Cantabrica, S.A., and built a steel plant at Haedo, Buenos Aires, where 2 railroad lines have connections and low freight rates between plant and port could be had. This plant consisted of two 20-ton open-hearth furnaces with an annual capacity of 25,000 tons, rolling mills for rounds and small shapes, and a foundry and sheet metal works. It employed 300 men.[24] It turned out finished products: fence posts, agricultural implements, wire mesh, tanks, ornamental iron work, and structural steel bridges.[25]

Table XI shows the aggregate growth in the industry from 1937 to 1942 and the percentage increase from 1937 to 1941 for each of the criteria enumerated.

There was an increase of approximately 20 per cent in plant capacity, and also in employed workers between 1937 and 1941. The number of salaried workers increased by 32.3 per cent, while the wage earners increased by only 17.6 per cent. This is a good indication that advancement was made in the industry, since one may safely infer that the ratio of technicians and skilled workers to laborers undoubtedly increased.

When considering the other remaining criteria as measures of industrial growth, the fluctuation in the value of the peso must be kept in mind.[26]

---

[23]"Mineral Resources, Production, and Trade of Argentina," Foreign Minerals Quarterly, Vol. 3, No. 3 (July, 1940), p. 32.

[24]Foreign Minerals Quarterly, op. cit.

[25]"The Argentine Iron and Steel Industry and Trade," Trade Information Bull. No. 776, Bur. of Foreign and Domestic Commerce, 1931.

[26]See Chapter I of this dissertation. One peso = $0.3296 in 1937, but dropped to $0.2977 in the 1941 to 1944 period.

There was a total average increase of almost 35 per cent in the wage bill, the expenditure for raw materials, fuels and lubricants, the value of production, and the value added by manufacture between 1937 and 1941. It is worthy of note that the total value of raw materials of domestic origin consumed in the iron and steel industry increased by more than 50 per cent, as did that of fuels and lubricants consumed, between these same years. On the other hand, it is well to mention that the proportion of national raw materials to foreign raw materials was only about one-fifth in 1937 and 1939, but rose to one-third in 1941. The industry depended largely on foreign sources for the essential industrial raw materials as late as 1941. Unfortunately, no data are available from which one may deduce the dependency on raw materials of foreign origin beyond the year 1942. Furthermore, no statistical data similar to those compiled in Table XI have been published beyond the year 1942 that would enable one to carry through the above analysis to the present time.[27]

A still more detailed picture of the growth of the iron and steel industry from 1937 to 1941 may be discerned through the use of plus and minus signs for each of the criteria used.[28] A plus sign indicates an increase, a minus sign denotes a decrease, and a zero signifies that there was no change from 1937 to 1941. The over-all picture for the subcategories of the iron and steel industry may be summarized thus: 1.) numbers 2, 4, 7 and 12 registered increases in each criterion; 2.) numbers 1, 3, 5, 9, 10, 13, 14 and 15 showed increases in more than half of the criteria; 3.) in number 8 the criteria were equally divided between

---

[27] Any mention of conditions in the iron and steel industry beyond the year 1942 is based on information found in periodical literature and current publications of recent date.

[28] See Appendix Table 7.

increase and decrease; and 4.) numbers 6 and 11 showed a decrease in more than half of the criteria. The significance of such an enumeration of facts is simply this, that subcategories, numbers 1, 2, 3, 4, 5, 7, 9, 10, 12, 13, 14 and 15 represent growing phases of the iron and steel industry, while the subgroups, numbers 6, 8 and 11 mirror stationary or declining branches of that industry.

For a closer examination of these two phases of the industry, the expanding and the declining, it will be necessary to inspect the criteria for each subgroup of the industry,[29] and also to draw upon other statistical data too detailed to include in any table.

First, a vertical analysis will be made on the basis of the criteria presented. While there was a general increase in the number of plants between 1937 and 1941, only in subgroup number 4, was the increase more than 25 per cent. Four subgroups, numbers 5, 7, 12 and 14, registered increases of more than 25 per cent in the total occupied workers, and number 4 showed an increase of more than 50 per cent. Two industrial subgroups showed more than 25 per cent of a growth in wages and salaries, these being numbers 7 and 12, while number 4 indicated, again, an increase of more than 50 per cent. All the industrial subgroups, with the exceptions of numbers 6, 8 and 15 increased by more than one-fourth the total value of raw materials utilized, with five industries showing an increase of more than 50 per cent, these being numbers 4, 5, 10, 11 and 12. Two-thirds of the subcategories accelerated their consumption of fuels and lubricants by more than 25 per cent, while numbers 1, 4, 9, 10 and 12 doubled their utilization of fuels and lubricants. Two-thirds of the subgroups were found to have increased their value of production, by more

---

[29] See Appendix Table 7.

than one-fourth and two of these by more than 50 per cent (numbers 4 and 12), while three of the subcategories, numbers 4, 7 and 12 doubled their value added by manufacture, and five others by more than 25 per cent (numbers 4, 5, 10, 13 and 14).

A horizontal analysis of this same table on the basis of each subgroup of industry is also fruitful. Upon the summation for each subgroup of the number of criteria for which the industry showed more than a 50 per cent increase, it is apparent that number 4 ranks foremost among the allied industries by doubling its working force, its wage bill, its consumption of fuels and raw materials, its value of production and its value added by manufacture. Finished products of iron, with or without other metals was, therefore, the leading subgroup of iron and steel manufacturing from the point of view of expanding its output. That this advance was largely due to a more effective utilization of the physical plant and perhaps by a greater level of efficiency of the workers is attested by the fact that the plant capacity was increased by only 34 per-cent. Iron furniture, sanitary articles of iron and tanks (probably oil and water tanks) were the three leading fabricated products; others consisted of the manufacture of tin plates, chains, expanded metal, buckets, steel springs, tools, solder, and arms.

The manufacture of hardware for doors, windows and furniture (subgroup number 12), was next in importance with respect to the number of criteria showing a net increase of 50 per cent between the years 1937 and 1941. Fuels and all raw materials consumed doubled in value, on the basis of consumption. While the wage bill almost doubled, the plant capacity increased by only 9 establishments. These conditions resulted in an increase of more than 50 per cent in the value of production, and the value added by manufacture. Hardware for doors and windows amounted to about

4 times more by value than did the next fabricated article, locks. Here again, one may infer that the accelerated production was due to a more efficient utilization of the plant facilities and by a greater output per worker.

The third-ranking subcategory of iron and steel manufacturing in Argentina, from the point of view of expansion from 1937 to 1941 was that of making iron and steel pipes, especially of cast iron (number 6). Galvanized pipes, cast iron pipes, other pipes of iron and steel, unions, and elbows were the principal products. Only one additional plant was in operation. The number of workers increased by only 184, the number of primary motors remained unchanged, and the wage bill showed only a small increase. The raw materials and fuels consumed increased by more than 50 per cent, by value, but the value of production and the value added by manufacture advanced by somewhat more than 25 per cent.

Another branch of the iron and steel industry which showed some acceleration was the fabrication of safes and metal furniture (subgroup number 9). Metal office furniture, hospital furniture and furniture for domestic use constituted the most valuable of the products made. The value of the raw materials, both national and foreign origin, and of the fuels and lubricants consumed doubled for the years already cited. The value of production was augmented by a little over 25 per cent, but the value added by manufacture was considerably less. Only 6 additional plants were enumerated and an addition to the working force of only 392 persons.

Other subgroups of iron and steel manufacturing showed signs of expansion, but on a smaller scale than those mentioned above. The manufacture of kitchen ranges and heating units (number 5), bolts, screws, rivets, and nails (number 7), platform and other scales (number 14), wire,

especially stranded and galvanized (number 13), iron and steel, smelted, rolled, and fabricated into finished products (number 1), and finished products of tin plate, especially containers (number 2), all showed composite increases.

The manufacture of beds of iron and brass (number 11) was one of the industries showing a decline, the other being galvanized iron, especially sheets (number 6).

Number 8, rural articles - wire mesh, vats, tanks, and windmills, was unique among the other subgroups. It showed an increase in the number of plants, in the horsepower of the primary motors, and in fuels and lubricants used. The wage bill increased, but the number of wage earners fell. The value of raw materials decreased, as did also the value of production, but on the other hand, the value added by manufacture showed an increase. Hence, from these paradoxical characteristics one may safely infer that the mills probably installed more power-driven machinery, thus causing a decline in the working force, but nevertheless, resulting in a greater increase in the value added by manufacture.

From this succinct analysis of the growth of the iron and steel industry in Argentina between 1937 and 1941 certain conclusions may be drawn for the iron and steel industry as a whole. These are: 1.) the iron and steel industry of Argentina showed an appreciable growth, and was an expanding industry, 2.) the consumption of raw materials of domestic origin doubled, by value, 3.) the use of raw materials of foreign origin increased by one-third, by value, 4.) the total expenditure on fuels and lubricants doubled, 5.) the number of salaried workers showed a greater increase than did the number of wage earners, 6.) the industrial wage bill was augmented by some 20 per cent, 7.) the value of production increased by one-third, and 8.) the value added by manufacture, by one-fourth.

Other generalizations for the subgroups of the iron and steel industry need to be summarized also. They are as follows: 1.) each of the subcategories, with the exception of numbers 6 and 11, showed a marked increase, in some cases more than 50 per cent, for the criteria employed, and therefore represented the expanding phases of the industry, 2.) there was a marked increase of more than 25 per cent in the value of raw materials consumed by three-fourths of the subgroups of the industry, 3.) the cost of fuels and lubricants also registered a considerable increase in outlay of more than 25 per cent in three-quarters of the subcategories, 4.) the value of production was characterized by an increase of more than 25 per cent in 10 of the industrial subgroups, 5.) a similar increase was in evidence for eight of the subcategories under the heading of value added by manufacture, 6.) the increase in plant capacity was very small, exception made for the manufactural group, finished products of iron with or without other metals, in which the increase was 34 per cent, 7.) the subgroups showing the most growth were finished products of iron, metal furniture, scales and hardware, 8.) the two most important subgroups on the basis of total value of production were iron and steel, smelted, rolled, and fabricated into finished products, and finished products of tin plate, especially containers, and 9.) the most advanced stages of iron and steel fabrication, production of finished products was undeniably the chief concern of the manufacturers, less growth was noted for number 1, which represents some smelting and rolling of iron and steel.

Some attempt will be made here to offer an explanation for these salient characteristics, but details await further analysis of the iron and steel industry, the nature and sources of the raw materials it uses, and the trade in these products. It will be sufficient here merely to suggest plausible explanations for the great increase in the expenditure

on raw materials. This was due in part to the increased cost of importing them as a result of the world conflict and to the additional costs incurred in allocating and exploiting domestic raw materials. Likewise, the cost of imported coal and fuel oil was due to the same condition, plus the fact that the shortage, especially of coal, resulted in the burning of residues and wood in the power plants and boilers at a considerable cost to the efficiency of the producing unit.

Neither the plant capacity nor the labor force increased to such an extent that one ought to expect appreciable overproduction to result and a closing down of plants, upon the return to normalcy of world conditions. The durable goods fabricated were designed primarily to meet the demands of the domestic market. An export trade of small proportions was built up, and accelerated somewhat, during the war years.

Geographic concentration of the iron and steel industry in Argentina, 1941.--The manufactural industry of Argentina is an exemplar for the iron and steel industry in its concentration, not only regarding the scale of operations, but also in respect to its geographic location.

Of the 1.005 iron and steel mills in the country in 1941, 953, or 94.8 per cent, were located in the Central Agglomeration, and only 52, or 5.2 per cent, in the rest of the Nation (Table XII). Within the Central Agglomeration was an inner zone of compactness, namely, the Federal Capital that had 571, or 56.8 per cent, of all the iron and steel mills in the country. Another 239, or 23.8 per cent, of the total number of mills were located in the Province of Buenos Aires. While there are no statistical data available to aid in further locating these establishments, through geographical inference one may conclude that most of them were situated in Greater Buenos Aires. A similar conclusion that the mills are in the large cities and towns where a labor supply is on hand, would

TABLE XII

GEOGRAPHIC CONCENTRATION OF IRON AND STEEL MILLS IN ARGENTINA, 1941*

Sub-group**	Central Agglomeration						Rest of Nation	GRAND TOTAL
	Federal Capital	Buenos Aires	Santa Fé	Córdoba	Entre Ríos	Total		
	- Number of establishments -							
1	56	41	16	3	-	116	10	126
2	83	36	14	3	5	141	6	147
3	133	74	32	18	8	265	23	288
4	97	60	7	-	1	145	6	151
5	33	4	5	2	-	44	3	47
6	4	2	2	-	-	8	-	8
7	9	6	1	-	-	16	-	16
8	15	17	3	2	2	39	3	42
9	30	4	2	-	-	36	-	36
10	6	2	-	-	-	8	-	8
11	46	2	7	1	-	56	-	56
12	35	4	2	-	-	41	-	41
13	9	2	1	-	-	12	-	12
14	8	5	4	1	-	18	-	18
15	7	-	-	1	-	8	1	9
Total	571	239	96	31	16	953	52	1.005
% of Total	56.8	23.8	9.5	3.1	1.6	94.8	5.2	100.0

*Estadística Industrial de 1941, op. cit., pp. 252-256.

**See Table XIV for title of each entry.

apply to the 96 mills in the Province of Santa Fé, the 31 mills in the Province of Córdoba and the 16 mills in the Province of Entre Ríos. Figure 5 shows this distribution.

Table XXI presents other significant details. For instance, the Federal Capital has more than twice as many iron and steel mills as has the Province of Buenos Aires. In each one of the subcategories, with the exception of the manufacture of rural products (wire mesh, vats, tanks, windmills), the Federal Capital had within its limits the greatest number of establishments. In fact, it has most of the plants making finished products of tin plate (number 2), construction materials (number 3), finished products of iron (number 4), kitchen ranges and heating units (number 5), safes and metal furniture (number 9), beds of iron and brass (number 11), and hardware (number 12).

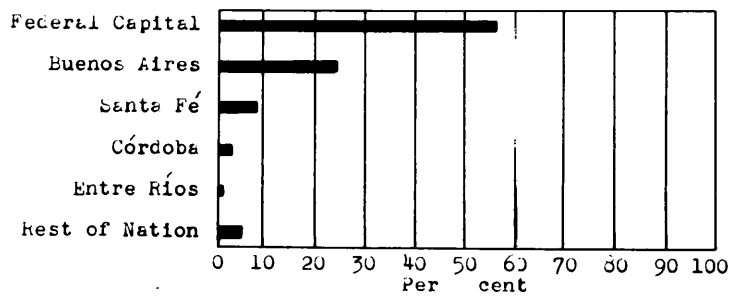
These iron and steel mills are distinctly market-oriented. This can be inferred from the nature of the products fabricated. The largest consuming market of the Nation, Greater Buenos Aires, is right at hand. Transportation costs on finished products would be high, because the products are high in value, are bulky, and are in demand, and therefore, the finished products would have a tendency to be sold within an economical radius of the plant. That radius widened considerably during the war, when exceptionally high prices could be obtained and when other Latin American nations were in dire need of such products, to include Bolivia, Chile, Paraguay, Colombia, Uruguay, Peru, Brazil, United States, Ecuador and Spain. The value of the total exports, however, was very small in proportion to the national consumption.

Furthermore, the cost of assembling foreign raw materials for fabrication, upon which the mills still depended heavily in 1941, by these mills in Greater Buenos Aires, would be considerably less than anywhere

IRON AND STEEL MANUFACTURING IN ARGENTINA 1941

(NUMBER OF ESTABLISHMENTS)

LEADING PROVINCES BASED ON NUMBER OF ESTABLISHMENTS



SCALE

0 100 200 300 400 MILES

0 100 200 300 400 500 600 KILOMETERS

SINUSOIDAL PROJECTION

Source: Estadística Industrial de 1941, op. cit., pp. 252 - 6.

L.N.D.

GOODE'S SERIES OF BASE MAPS
HENRY M. LEPPARD, EDITOR

FIGURE 5

Prepared by Henry M. Leppard
Published by the University of Chicago Press, Chicago, Illinois
Copyright 1941 by the University of Chicago

else in the country.

An economical basis of production, in times of peace, has proven to be the prime motive for locating most of the iron and steel mills in Greater Buenos Aires. The pull on the iron and steel industry by this very large consuming market has been, to date, unparalleled by any of the other industrial districts.

National consumption of iron and steel products in Argentina.--The value of the national production of iron and steel products in Argentina showed a steady rise, between the years 1937 and 1942 (Table XIII). The importation of iron and steel commodities marked a precipitous decline, while the exportation of iron and its manufactures more than doubled. The total value of the national consumption showed a very small decrease between 1937 and 1942. The most profound alteration over these years, however, has been the sharp decline in the deficit in the national consumption, which dropped from 46.8 per cent in 1937 to 8.1 per cent in 1942. This was due chiefly to the stimulation of local industries to fabricate products, especially finished products, for the home market, and by so doing, reduce the importation of similar products. This has been accomplished largely through the activities of the government in arranging the customs tariff in such a way as to favor the import of primary raw materials, pig iron, ingots, bars, sheets and others by permitting them to enter duty-free, or on a low tariff assessment, at the same time raising the tariff duty on finished articles, especially those that might compete with the products of local industries. There has been an embargo on the export of ferrous scrap ever since 1929.

The normal consumption, by tonnage, of iron and steel products has been estimated by several authorities and for different years. The

TABLE XIII

NATIONAL CONSUMPTION OF IRON AND STEEL PRODUCTION IN ARGENTINA
For the Years 1937, 1939, 1941 and 1942*

Item	1937	1939	1941	1942
	- Pesos -			
1. National production	204.720.000	228.569.000	296.264.000	326.700.000
2. Importation (tariff value)	181.713.500	121.823.907	61.970.923	32.485.441
3. Exportation (market value)	1.632.256	1.673.733	3.547.343	5.902.111
4. Difference (2 - 3)	180.081.245	120.150.174	58.432.580	28.583.330
5. Nat'l. consumption (1 + 2 - 3)	384.801.244	348.719.174	354.678.580	355.283.330
6. Per cent deficit of consumption (4 ÷ 5)	46.8	34.5	16.5	8.1

*Estadística Industrial de 1941, op. cit., pp. 94-99, Estadística Industrial de la República Argentina, 1942, op. cit., pp. 47-49, and Anuario del Comercio Exterior de la República Argentina, 1938, pp. 237-39, 456-63; - 1940, pp. 225-53, 439-46; - 1942, pp. 247-69, 429-36.

Banco Central de la República Argentina[30] estimated that the Argentine consumption of iron and steel in normal times exceeded 600.000 tons, almost all of which was imported. It further stated that the requirements for 1943 dropped to 300.000 tons due to the increase in price and the difficulty of procuring them from abroad, plus the rationing measures taken by the Government. To cover this demand in 1943 the country had at its disposal 85.000 tons of imported material, supply uncertain, 70.000 tons (castings and rolled products) of domestic production, and 145.000 tons of stocks in the country, that is, the stocks on hand which were held by the manufacturers and dealers.[31]

An estimate of the Argentine national consumption, by tonnage, was made by an outside source, the Corporación de Fomento de la Producción (Chile),[32] which closely parallels that of the Banco Central de la República Argentina. The actual consumption in Argentina was said to be 600.000 tons, while the Nation's production was 70.000 tons. More specifically, the report cites the imports of Argentina in 1939 as being 594.000 tons, the

---

[30]Banco Central de la Repu'blica Argentina. Eighth Financial Period 1942, op. cit., p. 58.

[31]The Central Bank draws this conclusion concerning the situation in 1943: "From the foregoing analysis of the possibilities of supply, it might be inferred that the situation in regard to iron and steel during 1943 does not seem to justify immediate concern. This is true if available supplies are treated as a whole, but not if the situation regarding various types of articles is considered separately....there is a marked shortage of steel cables (for oil wells and mining, merchant ships, cranes and spare parts for elevators), special and rapid steels for tools, lathes and dies, black and galvanized seamless pipes and tubes for oil wells and mining purposes and for boilers; round iron of small diameters for building purposes and some classes of railway and tramway material." Banco Central de la República Argentina, op. cit., pp. 58-59.

[32]Corporación de Fomento de la Producción. Informe de la Comisión Gubernativa sobre la Industria Siderúrgica en Chile. Reimpresion de los "Anales del Instituto de Ingenieros de Chile," de los Nos. correspondientes a Enero, Febrero, Marzo y Abril-Mayo de 1943, p. 27.

production capacity 67.000 tons, and the deficit as that of 527.000 tons.[33] Of course, their interest in the Argentine situation was to show the importance of Argentina as a consumer of steel, and to suggest the possibility that the Chilean siderurgical industry might expand in that market.[34]

A much larger estimate, which included all forms and manufactures of the national metallurgical industry, was made by de Nardo. The national metallurgical production of iron and steel was said to be about 200.000 tons, while the needs of the country, according to an average of the last 20 years, reached 710.000 tons.[35]

Still another estimate was made by Sarrate.[36] He calculated the national production of Argentina to be 80.000 tons, annually, produced by open-hearth and small electrical furnaces, or about one-tenth of the normal consumption.

Short-term measures which were resorted to in order to cope with this deficit in production consisted of finding new sources of imports during the war years, and of rationing.

Upon the request of the United States Government the Central Bank of Argentina supplied it with an estimate of the Nation's requirements for

---

[33] Ibid., pp. 31-32.

[34] Las posibilidades de crear una industria siderurgica en Argentina son muy remotas, porque el país carece de carbón y los yacimientos de hierro conocidos son escasos y de ley pobre. Además se hallan ubicados a gran distancia de los centos de consumo y de las fuentes de energia. Esto hace pensar que la República Argentina tendría que seguir dependiendo de las importaciones para su aprovisionamiento de acero. Ibid., p. 31.

[35] Juan B. de Nardo, "Generalidades con Relacion a la Siderurgia y Analysis desde el Punto de Vista Technologico," Boletin de la Secretaria de Industria y Comercio, Numero IV - Año 1 (Enero de 1945), p. 156.

[36] O. Lamm Sarrate, "La Argentina y la Industria Metalúrgica," Mineria Boliviana, Año 1, No. 9 (Agosto, 1944), pp. 32-34.

119921

1942.[37] The Bank requested importers to submit figures regarding their minimum essential articles for 1942, classified by probable use. For purposes of comparison, data were also requested on imports and uses for several previous years. Through the assistance of the Manufacturers' Association (Unión Industrial Argentina) and the Importers' Association (Centro de Importadores), explanatory memorandums were prepared for each article and forwarded to the Ministry of Finance. There they were studied and then sent along to the United States Government.[38]

In the table compiled by the Argentine Government entitled "Materials Essential to the Economic Activity of the Country," iron and steel products appear as one of the chief articles considered critical and subject to export quotas in the United States. The average tonnage of imports of iron and steel by Argentina between 1938 and 1940 was 641.400 tons, 341.400 tons in 1941, and 127.000 tons in 1942, and the estimated minimum indispensable imports for 1943 totaled 85.000 tons, 45.000 tons of which were to be supplied by the United States.[39]

The first important measure to conserve iron and steel was taken in 1939 when the exportation of these products was prohibited.[40] This state-

---

[37] In normal times the essential supplies of Argentina could be procured from several countries. Due to war conditions, however, the United States was the chief source. Since the United States had the problem on its hands of meeting the requirements of its armament industry, satisfying the home market, and meeting a foreign demand considerably above normal, it made the request of the Argentine Government to submit a list of materials essential to the economic activity of the country.

[38] Banco Central de la República Argentina, Seventh Financial Period 1941, op. cit., pp. 29-32, and Eighth Financial Period, 1942, op. cit., p. 57.

[39] Ibid., Eighth Financial Period, 1942, p. 57.

[40] U.S. Tariff Commission, Economic Controls and Commercial Policy in Argentina, op. cit., p. 40.

ment may seem a bit disconcerting when one looks at a list of the exports of iron and its manufactures and finds that more than 1.000.000 pesos worth of those products left the country annually from 1937 to 1943. The restrictions which have been employed undoubtedly fell into the category of expertations which were controlled by means of a prior permit system for many of the products of domestic origin.[41]

In July 1942, the Iron and Steel Rationing Commission (Comision de Racionamiento de Hierro y Acero) was established. It was requested to make an inventory of iron and steel products in the country and to control their distribution and prices. It could, when necessary, expropriate existing supplies. Merchants were required to declare their stocks and to obtain permits from the Commission before buying or selling such merchandise. In March 1943 the Commission became an agency of the Export and Industrial and Commercial Development Commission.[42]

Long-term plans, to meet the deficit in the national consumption of iron and steel have also been made. The Government has assumed the initiative by encouraging the utilization of domestic raw materials, by instigating beginnings in the primary phases of manufacture, by culminating trade agreements with the neighboring countries, and even by making a loan to Spain. These measures will be touched upon only briefly here, since they involve much detail that will be handled in later pages.

To free the home industry as much as possible from such large dependence on raw materials of foreign origin, the Dirección General de Fabricaciones Militares installed a small blast furnace (alto horno) at Zapla, Jujuy. The richest known iron ore deposits were investigated in that area

---

[41] Ibid., p. 43.

[42] U.S. Tariff Commission, op. cit., p. 40.

within the past few years, and there is available wood from which charcoal can be made for the purpose of smelting the iron. It was estimated that the daily capacity of the smelter would be 50 to 60 tons of cast iron, or about 15.000 tons of ingots annually.[43] The quantity produced will not be sufficient to replace importations, but sufficient to maintain a steady supply for the most urgent needs.

An example of the Government's interest in furthering the exploitation of raw materials was shown by the signing of an agreement with Loma Negra, S.A. according to which this firm will simultaneously produce Portland Cement and first pressure pig iron.[44]

Another plant for the production of 150.000 tons of ingots and semi-finished products annually, and with a rolling capacity of 350.000 tons was planned to be erected at one of the ports of the Rio Paraná, or near the State Railway line between Buenos Aires and Rosario. It was to have 2 or 3 open-hearths of 40- to 70- tons capacity.[45]

The Five-Year Plan definitely states that the production of "steel blooms" which was 120.000 metric tons in 1943 is to be increased to 315.000 tons by 1951.[46]

Decrees have been passed by the Central Government to assure a greater consumption of certain of the Nation's natural resources, as coal and wood. These will be elaborated upon in later pages.

Realizing that the Argentine market is somewhat limited and that in order to make progress in improving factory techniques and increase output,

---

[43] Sarrate, op. cit., p. 32.

[44] Schuck, op. cit., p. 61.

[45] Ibid.

[46] Review of the River Plate, op. cit. (November 1, 1946), p. 12.

it is vitally necessary to have wider markets, the Government has set about to accomplish such an objective. The Five-Year Plan has a unique method of exchange control whereby rates of exchange will be graduated for imports giving preference to raw materials and semifinished goods, and will be preferential for exports of the highest degree of processing. The preference for exports will be correspondingly less as the degree of processing is less.[47]

Argentine imports of industrial raw materials and manufactured products of iron and steel.-The importation of iron and its manufactures has been one of the means of meeting the Nation's consumption requirements of iron and steel goods. The proportion of the annual needs accounted for by imports showed a steady decline between 1937 and 1942. It amounted to approximately one-half in 1937, one-third in 1939, one-sixth in 1941, and only about one-tenth by 1942 (Table XIII).

The statistical data that appears in Anuario del Comercio Exterior de la República Argentina are conveniently broken down into two large categories which may be delineated under the headings of industrial raw materials for the iron and steel industry, and manufactured products of iron and steel for direct consumption.[48] It will be noted that the total of the first category of imports as compared with the total of the second category maintained a 3 to 1 ratio between 1937 and 1940, but the ratio increased to 4 to 1 between 1940 and 1943. In other words, the importation of industrial raw materials into Argentina has been more important than the importation of manufactured articles, but even more significant is the fact that the proportion of industrial raw materials to fabricated

---

[47] Rev. of the River Plate, op. cit., p. 14.

[48] See Appendix Table 6.

products imported has increased in recent years.

Two other significant trends may also be gleaned from this table, namely, that the value of imports of industrial raw materials dropped by almost 54 per cent between 1937 and 1942, while the importation of finished products totaled a larger decrease of 57 per cent between these same years. Even though these percentages are based on tariff valuations, they are an approximate reflection of the physical volume of the imports.[49]

Imports of industrial raw materials.[50]--The import of industrial raw materials includes three subcategories. First, iron unworked which includes scrap iron and steel, and pig iron or ingots for smelting. The second subcategory, hot-rolled products, or semifinished products, refers to steel bars, plates, sheets; steel rails for railroads and tramways; round and square iron bars and small plates; unworked iron plates; hoop

---

[49]For iron and steel imports, taken as a whole, in 1937 the tariff value was 182.0 million pesos, and the real value was 234.4 million pesos, or a difference of + 52.4. There was about the same ratio in 1942, the tariff value being 32.4 million pesos and the real value 87.8 million pesos, with a difference of + 55.4.

The corresponding data for industrial raw materials was 141.3 million pesos (tariff value), and 192.6 million pesos (real value), or a difference of + 51.3 in 1937. For the year 1942, the figures were 25.3 million pesos (tariff value), and 67.9 million pesos (real value), or a difference of + 42.4.

A similar analysis of the manufactures of iron and steel are these: 1937, tariff value 40.3 million pesos, real value 41.8 million pesos, and a difference of + 1.4; and in 1942, tariff value 6.9 million pesos, real value 19.9 million pesos, or a difference of + 13.0.

An obvious conclusion is that the tariff value corresponded to the real value more closely in terms of manufactured articles than in the case of raw materials. Or, in other words, the tariff value assigned to the raw materials is an understatement of the market value of the same. Perhaps this is a good thing considering the fact that there is weight loss in converting these semifinished products into more advanced stages of iron and steel goods ready for the consuming market, wherever it may be.

[50]Anuario del Comercio Exterior de la República Argentina, 1931, op. cit., pp. 286-293.

iron; unworked iron in sections L.T.U.K.; iron beams; galvanised sheets; fishplates and iron axles. And, the third subcategory comprises a variety of advanced forms of worked iron products, such as, wire of all kinds - galvanized and barbed; ropes; cast iron and galvanized iron pipes; wheels and axles; and a variety of nails, screws, and bolts - galvanized, polished and otherwise.

The uses of most of these imports is obvious and therefore only cursory mention will be made of a few of them. Round iron bars, for instance, were in demand in construction work for reinforced concrete. Steel in sheet form was used in making steel furniture, galvanizing, electric refrigerators, cookers and radio parts. Steel roofs are habitually used in farming regions. Black sheets were imported and then processed in domestic factories by galvanizing and corrugating. Cast iron pipes were used in making sanitary wares, while cast iron boilders were sold for central heating installations.

In 1941 more than 50 per cent of the scrap imported originated in the United States and some in the United Kingdom. Brazil supplied more than half of the pig iron, but some was also imported from Chile and the United States. Steel unworked, in bars, plates, sheets, beams and other similar forms, was supplied mostly by the United States, with additional imports coming from the United Kingdom, Sweden, and Canada. All the steel rails and iron beams, and more than half the round iron bars, and iron plates imported by Argentina were shipped from the United States. The United Kingdom and Brazil sent smaller quantities of the latter two commodities. Again, the United States furnished more than 50 per cent of the galvanized sheets, fishplates, iron axles, with the United Kingdom sending smaller amounts. United States supplied all the barbed wire and copper-colored wire, and more than half of all other wire products, with United Kingdom

and Japan exporting lesser amounts to Argentina. The cast iron pipes were purchased chiefly in Brazil and the United Kingdom, the galvanized pipes mostly in the United States. The chief producer's market for the purchase of nails, rivets, wheels and axles, screws and bolts was the United States with the United Kingdom following. Switzerland was the major source of origin for galvanized wire and certain classes of nails, brads, rivets, etc., Sweden for wood screws and nuts, and the United Kingdom for polished screws and nuts of iron.

On the whole United States was the major country of origin for the industrial raw materials used by Argentina in 1941, supplying 51.6 per cent of the Argentine purchases, by value. Next in order, but supplying very small percentages were Brazil, United Kingdom, Sweden, Canada, Japan, Chile and Switzerland.

Imports of manufactured products of iron and steel.--[51]--The imports of manufactured products of iron and steel for direct consumption, the second category into which the data on imports of iron and its manufactures are broken down, fall into clearly defined subgroups requiring few additional comments.[52] Under the heading kitchen articles are listed such goods as enamelled iron ware, pails, basins, heaters, articles of iron and tin plate, and others. The largest item under the heading of cutlery is butcher knives, others being table knives, scissors, and razor blades. Hardware covers such products as iron hinges, iron padlocks, knobs, spigots, and bolts. Tools constituted one of the larger items of imports. Pliers, spades, drills, screw drivers, jacks, axes, hatchets, wrenches, hammers, shovels, circular saws, wool shears, pruning shears and others. The last

---

[51] Anuario del Comercio Exterior de la República Argentina, 1941, op. cit., pp. 294-311.

[52] See Appendix Table 6.

subcategory, other articles of iron and steel, is larger than any of the others, and includes wire cables for telephone and telegraph, needles, radiators, springs, iron valves, and others.

As to the country of origin in 1941 Brazil and the United Kingdom supplied most of the kitchen articles of iron and tin plate. United Kingdom was the source of more than half of the enamelled iron ware, pails and basins, with some also coming from Chile and United States. Sweden furnished more than half of the heaters for domestic use, with others coming in from United States. Brazil supplied well over one-half of the table knives, with Japan coming second. All the butcher knives were purchased from the United States, with others coming from Switzerland. Scissors originated principally in the United States and Brazil. The hardware came from three countries, Sweden, United States and Japan. The United States was undisputedly the country of origin for more than 50 per cent of the tools, with United Kingdom, Canada, Spain, Brazil, Sweden, Japan and Portugal also sharing in this trade. Wire cables came mostly from the United Kingdom, with United States, Brazil, and Sweden sending varying amounts. Needles originated largely in Japan, United States, United Kingdom, China, and Switzerland. Radiators, springs and iron valves were bought principally in United States and United Kingdom.

Considering the entire category of imports of manufactured products in 1941 the United States was the chief country of origin, furnishing 76.1 per cent of the Argentine imports. United Kingdom, Sweden, Japan, Brazil, Canada, Switzerland, Spain and Portugal followed in descending order.[53]

Commercial policies relating to iron and steel imports.--Although

---

[53]See Appendix Table 9.

Argentina assesses ad valorem rates on imports of iron and steel commodities, the duties are specific in effect, being based upon a fixed schedule of assessments established by the Government for each commodity. The valuations and the ad valorem rates applicable to them are uniform for imports from all sources. In other words, there is no discrimination between countries of the world on the basis of the tariff law. Any channelling of trade in iron and steel products has been accomplished through the manipulation of the system of exchange control. In this connection, it may be mentioned that the iron and steel exports of the United States were discriminated against, as were our exports in general to Argentina up to the latter part of 1941, by the fact that Argentine importers were issued exchange control permits for the importation of similar products from Great Britain and the Continent when such could be obtained, in preference to those from the United States.[54]

Importers desiring to purchase iron and steel products from the United States were unable to obtain foreign exchange at the official rate and were obligated to arrange for payment through the open market at a substantial additional cost in Argentine currency for such commodities for which exchange permits were given. From April 1935 to January 1938, for example, the total additional cost for having to use the open-market exchange was fixed by the Argentine Government at not less than 20 per cent of the official rate of exchange. On January 1938, the minimum percentage was

---

[54] Among the United States iron and steel products for which foreign exchange at the Argentine official rates was refused in 1936 were the following: structural shapes, rails, fishplates, bars, plates, sheets, tin plate and wire. On June 16, 1936, the Argentine Government amplified the list of United States products for which official exchange would be granted to include wheels, axles, cross bars, and other materials for railroads. U.S. Tariff Commission, Rpt. No. 128, op. cit., p. 445.

reduced to 10, but it actually continued at about one-fifth, or 20 per cent, owing to the contemporaneous depreciation of the Argentine peso in the open market.[55]

This practice, strangely enough, was in harmony with Argentina's policy of bilateralism, the buy-from-those-who-buy-from-us attitude. In order to maintain a stable currency in her country she felt that balancing her accounts with individual countries was essential. Tonnage steels from United Kingdom and the Continent (Belgium, Luxemburg, France, Germany, Poland, Italy and Sweden) were therefore preferred to steels from the United States as one phase of this policy.

With the onset of the world crisis, however, Argentina had to modify considerably her foreign trade policy. She soon learned that the huge amounts of blocked currency which had accumulated in her accounts through clearing agreements with the individual countries that were her best markets, especially Great Britain, was one of the disadvantages accruing from bilateral trade practices.

Argentina needed capital goods as well as imports of industrial raw materials - pig iron, ferrous scrap, and other semifinished ferrous goods for further processing, only to realize that her usual sources of origin were being closed to her, one after the other. To procure such commodities, and in addition necessary iron and steel manufactures, there was no other direction in which to turn except to the United States. The Exchange Control Board readily modified the rigidity of its controls. Official A selling rate (at a profit of only 11 per cent to the Government) was made available to these authorized importers, who held import permits, for preferred classes of goods (iron, steel, tin plate and others) irrespective

---

[55]U.S. Tariff Commission, op. cit., p. 303

of the country of origin, and to importers of goods from the United Kingdom.[56]

The United States thus came to supply almost 62,000,000 pesos, tariff value, or more than 75 per cent of the total value of iron and steel imports into Argentina in 1941.[57] This was due largely to the fact already mentioned that Argentina had no one else from whom to procure her essential supplies of semifinished and finished iron and steel products except the United States, coupled with the fact that the United States needed certain essential raw materials obtainable in Argentina, in addition to advocating the Good Neighbor Policy. A trade agreement was signed late in 1941 in which each country granted to the other favorable treatment and reduced rates.

Certain iron and steel products continued to come in from the Continent after 1941, but in greatly diminished quantities. As the war advanced, none came, except from Sweden and Spain. And as far as the United States being able to fill all of Argentina's requirements, that was out of the question also, because the mills of the United States had a three-fold problem on their hands, namely, to supply the material of war, to satisfy

---

[56] U.S. Tariff Commission, op. cit., p. 30.

[57] Other countries supplying more than 1,000,000 pesos worth of iron and steel imports to Argentina in 1941 were: United Kingdom approximately 7,000,000 pesos; Brazil more than 5,000,000 pesos; Sweden about 1,500,000 pesos; Japan approximately 650,000 pesos; and Canada about 600,000 pesos. Chile and Spain each furnished less than 100,000 pesos worth of imports.

After the United States (that supplied 60 per cent), Brazil, United Kingdom, Sweden, Canada, in ranked order were the chief sources of industrial raw materials. Also, after the United States (that furnished approximately 54 per cent), the chief sources for manufactures of iron and steel destined for direct consumption were these countries, listed in order: United Kingdom, Sweden, Japan, Brazil, and Canada. Anuario del Comercio Exterior de la Republica Argentina, 1941. op. cit., p. 137.

the home market, and to meet as much of the foreign demand as it could. Everyone knows the conditions that followed. Argentina, of necessity, was forced to look elsewhere[58] and to negotiate agreements of varying kinds with other nations in order to try to meet her import needs of iron and steel.

A barter agreement was carried out with the Spanish Government in 1941 by which 350.000 tons of maize were to be paid for with Spanish iron and steel products.[59] A trade mission from Spain was sent to Argentina in 1942 for the purpose of facilitating further Spanish purchases in Argentina, involving goods essential to Spain, and of making proper arrangements regarding payments and the exportation from Spain of goods essential to Argentina. Spain gave express undertakings regarding the delivery of 30,000 tons of metallurgical materials, the building of 2 merchant vessels and one warship.[60]

---

[58] In 1942 a total of approximately 67,800.000 pesos, real value, of iron and steel products were imported by Argentina, of which 56.7 million came from United States, 13.0 million from Sweden, 7.0 million from Spain, 4.0 million from Brazil, 3.0 million from United Kingdom and 2.0 million from Canada. By 1943 the scene changed. Argentina imported only 56.700.000 pesos worth of iron and steel products, real value, of which the following proportions, in millions of pesos, were allocated to these various countries: 15.6 to Sweden, 14.6 to United States, 12.9 to Brazil, 5.9 to Spain, 2.4 to United Kingdom, and 1.2 to Chile. The United States remained the chief source of origin for the industrial raw materials in 1942 (about 65 per cent of the total), but relinquished that position to Brazil in 1943, which supplied almost 28 per cent, with United States and Sweden, each supplying another 25 per cent of the total. In 1942 the United States also sold most of the iron and steel manufactures to Argentina (about 60 per cent), and again had to bequeath that trade to Sweden (about 40 per cent) and several other countries that supplied about 1.000.000 or less pesos worth of imports of manufactured iron and steel commodities in 1943. Anuario del Comercio Exterior de la República Argentina, 1943, op. cit., pp. 112-113.

[59] Banco Central de la República Argentina. Seventh Financial Period, 1941, op. cit., p. 38.

[60] Ibid., Eighth Financial Period, 1942, op. cit., p. 43 and footnote p. 44.

A Decree of May 21, 1943 allocated the iron and steel supplied by Spain, first to contractors and public utility concerns, and second to direct users of iron and steel who had been customers in 1940. The remainder was distributed among Government agencies which needed more than had been assigned to them originally, and to private firms on the basis of the priorities established by the National Rationing Council. When certain quantities were still available, the Central Bank was authorized by the Council to allocate these to industrial concerns requiring iron and steel, and to habitual importers.[61]

Of the 30.000 tons to be sent by Spain in 1943, there were 29.428 tons that arrived. Of that amount 12.934 tons were allocated to Government agencies for public works, and 16.494 tons were used in the manufacture of baling wire and to meet the needs of public works contractors, public utility companies and other direct users.[62] By 1944, the quantity of iron which Spain had agreed to send to Argentina was raised to 82.500 tons. Of that figure, 68.529 tons had been shipped by December 4, 1944, and 78.687 tons up to January 31, 1945.[63]

The most recent agreement with Spain was that of October 30, 1946 in which Argentina agreed to send wheat, cooking oil and oil-bearing cake to Spain in exchange for 15.000 tons of pig iron, 5.000 tons of sheet iron, and other products (lead, cork, cigarette paper, olives and olive-oil).[64]

Negotiations also took place periodically with Brazil, a clearing

---

[61] Banco Central de la República Argentina, Tenth Financial Period, 1944, op. cit., p. 43.

[62] Ibid., Ninth Financial Period, 1943, op. cit., pp. 41-42.

[63] Ibid., Tenth Financial Period, 1944, supra, p. 32 and footnote p. 32.

[64] Foreign Commerce Weekly, XXV, No. 10 (December 7, 1946), 23.

agreement being signed in July 1941, whereby trade would flow more freely between these two countries. The Central Bank gave special consideration in 1942 to the facilitation of the purchase of certain articles from Brazil which were of vital importance to Argentina (machinery, iron and others) by making available free dollars for such purchases.[65]

In 1943, Argentina sold wheat, maize, tallow, meat, butter and cheese to Brazil, and purchased iron and steel, lumber, cotton textiles, coffee, fresh fruits, and cocoa beans from her.[66] Argentina imported 7.700.000 pesos worth of iron and steel from Brazil in 1943, but only 4.900.000 pesos worth in 1944.[67]

A reciprocal 5-year agreement was concluded with Brazil October 1946. Argentina will send wheat, wool and casein to that country and receive from it cast iron ingots, tires and tubes, crude rubber, cotton yarns and textiles, and wood and lumber.[68]

On June 14-15, 1946 a reciprocal purchasing agreement had been signed with Peru arranging for the exchange of Argentine wheat for Peruvian coal, petroleum, rubber, lead, antimony and other minerals.[69]

With the Union of South Africa an agreement was negotiated as of August 9, 1946 by which Argentina will exchange corn for coal.[70]

And, on December 13, 1946 the trade and financial agreement was con-

---

[65] Banco Central de la República Argentina, Eighth Financial Period, 1942, op. cit., p. 43.

[66] Banco Central de la República Argentina, Tenth Financial Period, 1944, op. cit., p. 30.

[67] Ibid.

[68] Foreign Commerce Weekly, XXV, No. 5 (November 2, 1946), 10.

[69] Ibid., XXIV, No. 6 (August 10, 1946), 13.

[70] Ibid., XXIV, No. 11 (September 14, 1946), 19.

cluded with Chile, through which Argentina hopes to acquire especially iron ore and coal in payment for wheat.[71]

The Argentine tariff as it pertains to iron and steel imports.-There are so many variables entering into a succinct analysis of the Argentine tariff policy, as in their commercial policy in general, that one who is unable to review the nonperiodical changes in the application of that policy made by the Argentine Government, through its mediator the Central Bank, could not possibly present a comprehensive nor convincing analysis, if indeed even an accurate picture, of the principles governing the import of iron and steel products into that country. To the expert, then, belongs the task of analyzing in detail, by making the necessary interpretations and interpolations, the functioning of the Argentine tariff law, along with the much more comprehensive system of exchange control, as it is related to the importation of ferrous materials and finished products of iron and steel.

Vertical view of the tariff on iron and steel goods for 1941.-Suffice it is to say that a vertical view of the ad valorem tariff rates on dutiable goods for the year 1941 indicates a quasi-graduated scale for products ranging from the less to the more advanced stages of iron and steel fabrication.

Scrap iron and steel and pig iron came in free of duty. Hot-rolled products (steel bars and plates, rails, iron bars and plates, hoop iron and ribbed plates, sections L.T.U.Z., beams, fishplates and axles, fell under several categories, some being duty-free, others having an ad valorem duty of 5, 12, 19, or 32 per cent, and one or two with the additional transitory duty of 10 per cent of the official valuation. As for these imports of iron and steel products advanced beyond the stage of the hot-

---

[71]See Chapter I of this dissertation.

rolled products, some going directly into the consuming market and others having certain operations performed on them, the percentage of ad valorem duty of the official valuation increased with the stage of fabrication. For example, it ranged from 5 per cent in the case of ungalvanized wire to 32 per cent for galvanized wire, and wire ropes on which the additional transitory duty of 10 per cent was added. Nails, brads and rivets were assessed 32 per cent, while wood screws and nuts had to pay a duty of 42 per cent. Screws and bolts of iron galvanized and ungalvanized had to meet a duty of 42 per cent as well as the additional transitory duty of 10 per cent, thus making a total of 52 per cent customs duty to be paid.

As far as the category of iron and steel manufactures is concerned larger proportions of the total tonnages were subject to an ad valorem duty, and to a generally higher rate of duty than were the products of the less advanced stages of fabrication, the duty being generally 32 per cent of the official valuation. For several commodities the additional transitory duty of 10 per cent was added, and in the case of fire arms the ad valorem duty was 57 per cent.

It is unsafe to interpret that latter high ad valorem duty as meaning that the Government wished to protect a home industry of that nature, since the Government may import as much as it chooses, of any particular commodity, free of duty. This fact does not reveal itself easily in Anuario del Comercio Exterior de la República Argentina since the imports for government purposes are usually taken to be included under those articles in which a stated tonnage is indicated as being subject to, let us say 5 per cent duty, while another stated amount of the same total tonnage, is specified as entering free of duty.

Let it be reemphasized once again that since the customs tariff has been the primary source of revenue for the Government it is merely a matter

of speculation as to where to draw the line between goods with a high tariff primarily to bring in revenue, and commodities with a high tariff designed to protect home industries.

Horizontal view of Argentine tariff on iron and steel products from 1937 to 1943.--A study of the tariff duties for selected iron and steel imports sheds some light on the argument presented earlier that the Government set about to encourage the development of a native iron and steel industry as the markets in Europe closed their doors to Argentine merchants. Scrap iron imports have not amounted to very large tonnages, but have shown a general increase in quantity. From 1937 to 1939 all imports were subject to the additional transitory duty of 10 per cent. In 1939 that 10 per cent duty applied to only 50 of the 245 tons imported, the rest coming in free. Between 1940 and 1943 ferrous scrap was non-dutiable.

Pig iron was imported in much larger quantities than scrap, about three-fourths of which were subject to a duty of 5 per cent between 1937 and 1940. From October 15, 1940 pig iron was permitted to enter free of duty.

In these two instances it would seem that the tariff duty had been removed in 1940 in order to encourage the import of those ferrous raw materials which are indispensable to the iron and steel industry. One might even go a step further by suggesting that since ferrous scrap and pig iron are the chief raw materials for the manufacture of steel ingots and castings, iron castings, and wrought iron, the Government desired to encourage those phases of the industry.

A view of the tariff duties as they applied to hot-rolled products is also enlightening. Of the unworked steel bars with less than 40 per cent carbon, more than 75 per cent of the tonnage entered free of duty. The other one-fourth was subject to a duty of 19 per cent ad valorem

between 1937 and 1940, but from 1941 to 1943 of the remaining one-fourth, which was largely subject to 19 per cent duty, a few tons had the additional transitory duty of 10 per cent placed on them. Unworked steel bars with more than 40 per cent carbon demonstrates slightly different characteristics as to customs tariff. More than half of the tonnages imported between 1937 and 1943 were dutiable, paying a duty of 19 per cent. Substantial tonnages were also free of duty, while small amounts were subject to the 10 per cent additional transitory duty between 1940 and 1942. A significant conclusion to be drawn here is that Argentina preferred larger tonnages of unworked steel bars of less than 40 per cent carbon and adjusted the tariff duties to favor their importation.

Steel rails, another hot-rolled class of goods ready for direct consumption upon importation, marked a steady and precipitous decline from 40.000 tons in 1937 to 40 kilos in 1943. Almost the entire tonnage came in duty-free from 1937 to 1941, and after the latter year the very small quantities obtainable entered without any customs duty being assessed. Not only are steel rails necessary for periodic replacements by the railroads and tramways, and for the extension of transportation lines, but the worn out rails constitute one of the best kinds of ferrous scrap. This will be discussed in later pages.

Unworked iron in bars, round or square, has been one of the major imports of ferrous materials into Argentina. More than 75 per cent have been subject to a duty of 5 per cent, and on small tonnages of the remainder the 10 per cent additional transitory duty was levied between 1940 and 1943. Unworked iron plates has also been a large tonnage import, governed by the same tariff regulations that applied to unworked iron in bars. Apparently the Government did not want to miss this opportunity to obtain revenue since iron bars and iron plates taken together, has long

been the largest single item of iron and steel import into the country.

Hoop iron and ribbed plates, amounting to only about one-fourth as much tonnage as iron bars or plates, had approximately 90 per cent of the tonnage subject to an ad valorem duty of 5 per cent. On only a very few tons was the 10 per cent additional transitory duty collected between the years 1940 and 1942.

On iron sections L.T.U.Z. imported for construction and other purposes, an ad valorem duty of 12 per cent of the official valuation was levied on more than three-quarters of the tonnage imported between the years 1937 and 1943. Some also came in free for each of these years. The 10 per cent additional transitory duty was collected for revenue purposes on a few tons in 1940 and 1941.

Galvanized iron sheets (hierro galvanizado en chapas) entered the Argentine market largely duty-free until 1941 when the pendulum swung the other way and the largest portion of the small tonnages imported were subject to a duty of 32 per cent. An interesting notation in Anuario del Comercio Exterior de la República Argentina, 1943, page 239 is that the 1.198 kilos, or the exact tonnage which originated in the United States, was assessed a duty of 32 per cent, while the 336 kilos, or the precise tonnage coming from Chile, were duty-free! Discrimination between countries is theoretically not a part of the Argentine tariff policy, yet this glaring example slipped into print in an official publication. Would that my inference were wrong!

Summary of over-all tariff policy relating to iron and steel commodities.-Generalizations concerning the allocation of tariff duties, between 1937 and 1943, on the industrial raw materials for the iron and steel industry are these: 1.) pig iron and scrap have entered free of duty since 1940, 2.) of the hot-rolled products, more than 50 per cent entered free

of duty, and of the remainder the largest part was subject to duties varying from 5 to 19 per cent, with a few tonnages, between 1940 and 1942, subject to the additional transitory duty of 10 per cent, and 3.) in general, the bulk of the tonnage imports of industrial raw materials, that constituted the major part of the iron and steel imports in 1941, entered the country free of duty or with low tariff assessments.

A generalization relating to the ad valorem duties levied on manufactures of iron and steel goods imported by Argentina in 1941 is also in the offing. On the whole an ad valorem duty of 32 per cent of the fixed valuations, in some instances higher, was levied. Moreover, larger proportions of the total imports of manufactured iron and steel commodities than industrial raw material goods were dutiable, exception made for tools, galvanized wire numbers 15 to 21, cast iron pipes of more than 75 mm, iron pipes of soft hammered iron, nails of hammered iron, and wheels and axles of which the largest tonnages were non-dutiable.

Further implications pertaining to Argentine iron and steel industry derived from tariff policy.--Some further indications that the Government desired to favor the siderurgical industry in general is mentioned in the last tariff law (1939), namely, that machinery and materials produced in the country which were destined for installation in siderurgical industries could enter the country without paying the additional 10 per cent transitory duty.[72]

The Central Bank verified this assumption at a later date (1943) by stating:

> ....there being no need to import in the same proportion as formerly manufactured goods or the materials now produced by national activity, a greater proportion of exchange will be available for the importation of the capital goods for the

---

[72] Tarifa de Avalúos y Arancel de Importación, op. cit., p. 441.

> development of industry, transportation and economic activity in general, not only because of the organic growth of these forms of activity, but also to effect whatever renewals may be rendered imperative by the severe wear and tear to which productive and transport equipment are at present subject: railway and city transportation material, automobiles, in which an exceedingly low level has been reached, commercial aviation equipment and other materials which are essential for the development and security of the country.....
>
> There is in all this another question of undeniable significance. The greater the proportion of foreign exchange devoted to the importation of those capital goods just mentioned, the less need there will be for this country to obtain additional exchange by means of loans or to resort to foreign capital to promote the further development of its economic life.[73]

The Executive Decree of June 6, 1944 was definitely protective in nature, the executive being given the power to impose additional duties of as much as 50 per cent on the existing rates in order to protect Argentine manufacturing industries from foreign competition. Industries eligible for such consideration are those processing Argentine raw materials for domestic consumption and those using materials of foreign origin in the production of prime necessities.[74] Iron and steel manufacturing should be considered as being one of those industries.

It would seem, also, that the Five-Year Plan definitely implies protection to the iron and steel industry inasmuch as it states that the number of steel blooms is to be increased from 120.000 in 1943 to 315.000 by 1951, and further that materials not produced in Argentina, or in insufficient amounts which are necessary for the manufacture of essential goods for national defense (machinery, transportation equipment, generating machinery, spares and other implements not yet manufactured locally) are to be exempt from customs duties.[75]

---

[73] Banco Central de la República Argentina, Eighth Financial Period, 1942, op. cit., pp. 31-32.

[74] U.S. Tariff Commission, op. cit., p. 29.

[75] Rev. of the River Plate, op. cit., p. 14.

Nature and origin of the raw materials used in the Argentine iron and steel industry.-National production of iron and steel manufactures, by value, has been the most important means of meeting the domestic consumption. The proportion of the Nation's demand that was met by home industries has shown a significant upward swing between 1937 and 1942. It accounted for about one-half the national consumption in 1937, two-thirds in 1939, five-sixths in 1941, and about nine-tenths in 1942 (Table XX). Industrial self-sufficiency (from the Argentine point of view) is measured by the smaller percentage of foreign raw materials used in manufacturing.[76]

The fact has already been pointed out that the iron and steel industry of Argentina has been largely secondary and tertiary in nature, inasmuch as the mills of the country have been primarily concerned with rolling, forging, casting, and turning out finished consumer goods. Common steels are manufactured in regenerating furnaces (hornos Siemens) and electrical furnaces (hornos eléctricos).[77] There are one or two iron and steel mills capable of all operations.

There were no blast furnaces in the country as late as 1941. Estadística Industrial de 1941 does not list any data pertaining to the production of pig iron. This fact was verified in an article appearing

---

[76] Doc. Presented to Conference of Commissions of Inter-American Development by The Argentine Commission of Inter-American Development. (Washington, D.C.: Inter-American Development Commission, Commerce Dep't. Bldg., 1945), p. 7.

[77] Of the various types of electric furnaces the most common and the most widespread in the country for the siderurgical industry is the electric arc furnace (arco con electrodos de carbón). There were some 20 of such furnaces in operation, around 1944, with a normal production of 750 tons monthly. The small capacity of the plants and the high cost of electric energy has resulted in production of special and high-quality steel (steel for mechanics in general). deNardo, op. cit., pp. 145-6, 156.

in Accion Economica, January 1942,[78] and again, in the Report Presented to the Conference of Commissioners of Inter-American Development by the Argentine Commission of Inter-American Development, May 1944, in which it was stated, "There is a complete lack of blast furnaces for initial smelting of iron...."[79]

The absence of blast furnaces suggests three possible conditions concerning the primary raw materials - iron ore, limestone and coke. Either there may be an absence of those raw materials, there may be deposits of high grade minerals at uneconomic distances, or perhaps, there might be present deposits of low grade resources which would result in such high costs of recovery that it would be cheaper for a Nation to import its requirements. Argentina's situation may be summed up under the heading of "scarcities." Up to 1941, no large reserves of high grade iron ore, favorable to economic recovery and utilization had been discovered. Nor did there occur in the country any deposits of high grade metallurgical coal of coking quality. Scattered deposits of limestone are on hand. The dearth of primary raw materials, therefore, precludes the turning out of "pigs" by altos hornos. Nevertheless, it did not prevent secondary stages of the industry from flourishing based upon imported raw materials (ingots, bars, sheets, coke, and others) and upon the available iron and steel scrap in the country. Herein lies the foundation of the Argentine iron and steel industry that has increasingly extended its capacity.

---

[78] La Argentina no produce fundición de alto horno, pero posee varios hornos para aceros, cuya capacidad anual producción puede calcularse en unas cien mil toneladas por año. A. Dorfman, "Bases Para la Formación de una Industria Metalúrgica Pesada en América Latina Mediante la Complementación Regional." Accion Economica, Año 11, No. 15 (Enero 29 de 1942), 24.

[79] Rpt. Presented to Conference of Commissioners of Inter-American Development by the Argentine Commission of Inter-American Development, op. cit., p. 54.

Origin of industrial raw materials.--Of the total value of industrial raw materials consumed by the iron and steel industry in 1941, 76.0 per cent were of foreign origin and 24.0 per cent of national origin. The corresponding percentages for the year 1937 were 81.0 and 19.0 per cent, respectively.[50] Fuels and lubricants were not included under the heading of raw materials in the Industrial Censuses, nor was there any breakdown of the origin of fuels and lubricants below the major categories of manufacturing already discussed in Chapter I. That the fuels consumed by the iron and steel industry are imported, almost in their entirety, is a matter of conjecture, therefore, based on the common knowledge that Argentina lacks high quality coking coal and produces insufficient amounts of fuel oil to meet current consumption.

Importation of ferrous raw materials.--More specifically, the import of principal ferrous raw materials consisted, in 1941, of small quantities of scrap, only 286 tons, and 28.121 tons of pig iron (hierro en lingotes para fundición). Hot-rolled products for further processing constituted the major class of raw material imports, by tonnage, and of these unworked iron in plates (66.740 tons) and unworked iron in bars, round or square, and in small plates (62.550) made up three-fourths of the total. Other raw materials of the same class, with fairly large tonnages, were hoop iron - 17.557 tons, unworked iron in sections L.T.U.Z. - 17.421 tons, and unworked steel in bars and plates - 5.419 tons. Others with only small tonnages were steel rails, galvanized iron sheets, iron covered with lead in sheets or hoops, iron beams, fishplates and iron axles.[51]

---

[50] Estadística Industrial de 1941, op. cit., pp. 47-49.

[51] Anuario del Comercio Exterior de la República Argentina, 1941, op. cit., pp. 286-293.

The tonnage of scrap imports varied widely, ranging all the way from 35 tons in 1935 to 1,302 tons in 1942.

The importation of pig iron has also registered notable variations in tonnages and sources of origin, for instance, there were approximately 25,000 tons imported in 1935 mainly from United Kingdom, Russia, France, Low Countries and Belgium; 27,000 tons in 1936 chiefly from Russia, Belgium and United Kingdom; 52,000 tons in 1937 largely from France, United Kingdom, and Low Countries; 25,000 tons in 1938 from France, Belgium, United Kingdom, Brazil, and others[62]; 56,000 tons in 1939 from France, Brazil, Belgium, United Kingdom, and Low Countries, mostly; 25,000 tons in 1940 chiefly from Brazil, United Kingdom, United States, and France; and again in 1941, 25,000 tons chiefly from Brazil, Chile, and United States; 6,000 tons in 1942 from Brazil, India, and Chile, mostly; and 23,000 tons in 1943 coming largely from Brazil, Chile and India.[63] The pig iron entered free of duty from October 15, 1940.[64] Such an enumeration of data is significant in pointing out the shift in the source of origin of pig iron from Europe to Brazil and the United States, and finally to Brazil, India and Chile as wartime changes took place in the economies of these countries named. Let it be emphasized that Brazil and Chile,

---

[62]That the tonnage of imports dropped by almost 50 per cent from 1937 to 1938 was not due to any slackening of the demand, but to the fact that imports in 1937 were unusually high as the foundries, in anticipation of difficulties in obtaining supplies from Europe, doubled their purchases. The stocks accumulated in that year were gradually liquidated and on the whole consumption tended to increase due to the further development of the local siderurgical industry. There was a steady demand for United Kingdom pig iron for better classes of work on account of its superior quality, the French and Belgium products being used mainly for foundry work. Gt. Brit. Dep't. of Overseas Trade, op. cit. (June, 1939), p. 143.

[63]Anuario del Comercio Exterior de la República Argentina, 1937 to 1943.

[64]Ibid., - 1940, p. 225.

both neighbors of Argentina, have supplied the latter Nation with pig iron.

Unworked iron in bars, round or square, and plates, also showed an irregular curve of importation over a period of years. Approximately 177.000 tons were imported in 1935. There was a slight drop in tonnage for 1936, but a sharp rise to 291.000 tons by 1937. In 1938 and 1939 the tonnage imported was around 175.000 tons. Up to 1940 the countries of origin were mostly Belgium, Luxemburg, France, Germany and Poland, but after 1940 the United States was the leading supplier, with Brazil, Spain and Chile also entering the trade. The imports declined precipitously after 1940, there being only 166.000 tons in 1940, 63.000 tons in 1941, 14.000 tons in 1942 and only 5.000 tons by 1943.[85]

The importation of unworked iron in plates was also very irregular. The imports oscillated around 100.000 to 160.000 tons between 1935 and 1939, and originated in the United Kingdom, Belgium, Luxemburg, France and Germany. After 1940, with its 115.000 tons, the marked decline set in, there being only 67,000 tons imported in 1941, 26.000 tons in 1942, and 7.000 tons in 1943, coming since 1939 from United States, United Kingdom and Spain.

The other raw materials enumerated above conform to the same general characteristics, of showing marked fluctuations in tonnages imported from 1935 to 1943, with 1937 commonly the year of greatest volume of imports, and with a general downward trend after 1940.

The Continent of Europe, the common source of those imports up to 1940, was superseded in 1941 by the United States (supplying 51.6 per cent, by value), and the remainder being distributed among these countries.

---

[85] Ibid., 1937 to 1943, supra.

listed in order: Brazil, United Kingdom, Sweden, Canada, Japan, Chile and Switzerland.[56] By 1942, the United States was able to furnish only 66.1 per cent of the total value (real value) of industrial raw materials into Argentina, with the remainder being allocated to Sweden, Spain, Brazil, United Kingdom and Canada, mentioned in order. Brazil became the chief source in 1943 (27.6 per cent of the total, real value), with United States and Sweden each sending about one-fourth of the imports, and the rest coming in chiefly from Spain, United Kingdom and Chile.[57]

Domestic scrap as a raw material.-Ferrous scrap as a raw material in steel making has received widespread adoption since the twenties. This has resulted in an ever-widening dispersion of the iron and steel manufacturing nations of the world, by freeing the steel mills from their heavy reliance on pig iron, which in turn is dependent upon the economical assemblage of the primary raw materials of iron ore, limestone, and coke. Steel industries, based largely on the utilization of scrap, have developed in Italy, Japan, and more recently in Argentina. Germany and the United Kingdom have also imported large tonnages of scrap. The United States has been the world's largest exporter of ferrous scrap.

A small part of the iron and steel scrap consumed by the countries of the world is used in the production of pig iron, iron castings, and wrought iron, but most of it is consumed in the production of steel. It is especially adapted for use in open-hearth furnaces.[58]

Ferrous scrap is made up of home scrap and purchased scrap. "All the ferrous materials, either alloyed or unalloyed of which iron and steel

---

[56] Anuario del Comercio Exterior de la República Argentina, 1941, op. cit.

[57] Ibid., 1943, pp. 112-113.

[58] U.S. Tariff Commission, Rpt. No. 125, op. cit., p. 62.

is the principal component, which are the waste of industrial fabrication or objects that have been discarded on account of obsolescence, failure, or other reasons,"[89] is the preferred definition for home scrap. Or, in other words, home scrap is a by-product of the iron and steel industry, being waste of blast furnaces, steel works, rolling mills, foundries, or any other materials which may be salvaged within the plant. Purchased scrap, on the other hand, is made up of scrap obtained outside the consuming plant, scrap transferred from other plants of the same company, and scrap obtained under exchange contracts or conversion agreements.[90] Shearings, borings, turnings, and the like produced by processors of iron and steel, and miscellaneous discarded articles of iron and steel constitute purchased scrap.

The most ideal form of scrap is that which is classified by the Institute of Scrap Iron and Steel as No. 1 heavy melting steel, which must be no more than 5 feet long, no more than 18 inches wide, and at least one-fourth inch thick in order to fit into the charging boxes of the furnaces.[91] It may include structural shapes, angle bars and plates, steel castings, heavy chains, carbon tool steel, heavy forgings, forge butts and similar heavy materials, as well as new machined pipe ends, sheet bars, billets, blooms, rail ends, railroad steel, and wrought scrap.

The ratios at which pig iron and scrap may be charged into open-

---

[89] War Production Board, General Preference Order M-24.

[90] Minerals Yearbook as quoted in National Resources Planning Board, op. cit., p. 147.

[91] Statement by E. C. Barringer, President and Executive Secretary of the Institute of Scrap Iron and Steel, Inc., which is the national trade association of the iron and steel scrap industry, appearing before the House Military Affairs Committee, March 11, 1942. Institute of Scrap Iron and Steel Yearbook (Washington, D.C.: Institute of Scrap Iron and Steel, Inc., 1942), p. 9.

hearth furnaces may be 40-60, 60-40, or even 100 per cent scrap, by special adaptation of the furnaces.[92] The quantities used depend on the product to be made, the type of furnace, and the cost differential between pig iron and scrap.[93] Every ton of iron and steel scrap substitutes for an approximate equal amount of pig iron.[94] To make one ton of pig iron requires the following amounts of raw materials: 2 tons of iron ore, 1 ton of coke, one-half ton of limestone, and 4 tons of heated air. These ingredients are charged into the blast furnace. After some 4 to 6 hours the blast furnace is tapped, and the output is 1 ton of pig iron, one-half to 1 ton of slag, and five and one-half to 6 tons of gas.[95] One ton of scrap is equivalent to about 2 tons of high grade iron ore. The use of scrap, then, in steel making is a means of conserving a Nation's supply of iron ore. It may be considered an economy practice, in a country such as Argentina, since the Nation would be spared the expense of constructing a blast furnace at an average cost of about 5.500.000 pesos, and of assembling iron ore, coke, and limestone from widely divergent regions. From still another angle, the use of ferrous scrap in the steel mills of Argentina is economical and advantageous. By beginning their industry with the secondary stages of fabrication, they are relieved from heavy dependence on high grade metallurgical coal and coke, and have a choice of fuels for application in their steel mills. Home supplies of fuel oil and natural gas may be relied upon.

Other advantages to the steel industry of using large quantities of

---

[92] Ibid., p. 5.

[93] U.S. Tariff Commission, Rpt. No. 126, op. cit., p. 127.

[94] Ibid., p. 124.

[95] Aldorfer and Michl, op. cit., p. 36.

scrap should also be mentioned. For instance, the ingot yield is higher when the charge of scrap is increased relative to that of pig iron. A study made more than a decade ago pointed out that the ingot yield increased from 88.27 per cent to 90.62 per cent in the same plant when the pig iron charge was dropped from 57.5 per cent to 40.4 per cent of the total charge.[96] The reason for this is that scrap usually contains less nonferrous impurities than does pig iron.[97]

Iron and steel are better metallurgically and sometimes lower-priced with the use of scrap. The scrap charged into a blast furnace, for instance is 100 per cent metal, while the iron ore contains only some 50 per cent, as in the case of Lake Superior ore, of iron, and many ores contain even a smaller percentage of iron. Less fuel in the open-hearth needs to be used when a portion or all of the charge is scrap.[98]

One other advantage of depending on scrap as a raw material is that it is self-perpetuating. It may be inferred from the definitions of home and purchased scrap above, that there will always be metallurgical waste or junk in a country, since there will always be by-products within the mills, and capital goods and transportation equipment that will be wearing out and requiring replacement. Scrap, then, is a non-expendable industrial raw material.

One disadvantage in the use of scrap should be mentioned. Compared with pig iron, scrap is less readily charged in the steel furnace than is molten iron. This extra charging time, especially for light and bulky

---

[96] C. D. King, "The Metallic Charge in Basic Open-Hearth Operations ....," Yearbook of American Iron and Steel (1931).

[97] U. S. Tariff Commission, Rpt. No. 126, op. cit.

[98] The Story of Scrap (New York: Institute of Scrap Iron and Steel, 1939), p. 3.

scrap, is a debit against scrap.[99]

Differences between the various grades of scrap cause differences in the quality and cost of steel produced. No. 1 heavy melting scrap is preferred. Its high weight in proportion to its bulk reduces the time required to charge it into the furnace. It is homogeneous, and is not contaminated with other metals. Light scrap requires a longer time to charge, but has the advantage of melting quicker, if it is not too light. If the scrap is thin a great deal of it oxidizes in the process.[100]

Under normal conditions the ratios in which pig iron and scrap are consumed depend on several factors. It is obvious that the ratio of pig iron to scrap will be higher in the case of integrated companies producing their own pig iron than in the case of non-integrated companies that must buy their pig iron. This ratio is also affected by the price differential existing between pig iron and scrap at any given time. As the price of pig iron moves above that of scrap, the proportion of the furnace charge consisting of scrap increases, and conversely, as the price of pig iron falls nearer to that of scrap, the proportion of the furnace charge consisting of scrap decreases.[101]

The reserves of ferrous scrap in Argentina seem to be ample, the exportation has been prohibited since 1929, and to have been drawn upon with increasing intensity since 1941 when the importation of pig iron took a precipitous drop by almost one-third in tonnage between 1941 and 1942.

Several Argentine writers venture a quantitative figure for the reserves of scrap (hierro viejo) in the country. One gives a figure of

---

[99] Instituto of Scrap Iron and Steel Yearbook, op. cit., p. 9.

[100] Ibid., pp. 9-10.

[101] Ibid., p. 9.

500.000 tons (en 1941), of which about three-quarters were furnished by the railroads.[102] Another states that the accumulation of scrap iron in the country by March 31, 1943 was 304.367 tons, that the actual yearly consumption was estimated at 80.000 tons, and that the production and accumulation in 1942, at some 25.000 to 30.000 tons, but during the current year (1943) perhaps less.[103] And still another, estimated the total accumulation in the country of hierro y aceros viejos, usado o inutilizado to be nearly 1.000.000 tons in 1943. This same source furnished other interesting data concerning the scrap iron situation in the country. The railroads constituted the principal source of scrap, the other sources being residues from manufacturing plants, automobiles, agricultural machinery and the ferrous waste coming from all other sources. The annual accumulation of residues of iron and steel is as follows: 1.) residuos de hierro y acero nuevos (from siderurgical furnaces, factory wastes, ends, and others), 30.000 tons; 2.) residuos de hierro y aceros viejos, 60.000 tons; 3.) varias otras fuentes de producción de desechos, 20.000 tons; and 4.) all others on which no concrete data are available, 220.000 tons. The grand total of scrap accumulation annually was 330.000 tons.[104]

---

[102] "Se calcula que existe un stock de 500.000 toneladas de hierro viejo, de las cuales las tres cuartas partes las poseen los ferrocarriles." And again, "....tenemos en la Argentina un remanente de hierro viejo calculado en 60.000 toneladas al año y un stock de medio millón de toneladas." M. L. Francioni and E. Llarens, Ritmo de la Economía Argentina en los últimos 30 años (Buenos Aires, 1941), pp. 146 and 147.

[103] These figures were quoted from la Dirección de Abastecimiento de Comercio e Industria de Ministerio de Agricultura de la Nación by A. Dorfman and F. F. Sintes Olivos, Encuesta Continental sobre Fomento y Coordinación de Industrias (Montevideo, 1944), p. 130.

[104] Eduardo A. Garimaldi, "Valor Industrial del Hierro Viejo," Boletín de la Secretaría Industria y Comercio, Número VI - Año 1 (Marzo de 1943), 385-9.

The yearly consumption of scrap as given by Dorfman, 80.000 tons, strangely enough, closely coincides with the figure calculated as necessary for the iron and steel industry of Argentina brought out in this dissertation. In 1941, the iron and steel industry in Argentina consumed 219.685 tons of ferrous raw materials, of which 83.707 tons, or 38.1 per cent, were scrap iron and steel (Table XIV). More specifically, in tonnage, 81.524 tons of scrap iron, and 2.183 tons of scrap steel were used.[105] Only 288 tons of the total scrap consumed were imported in that year.[106]

And, by comparing the consumption of ferrous scrap in the steel industry in Argentina with that of the United States for the same year, one learns that the open-hearth furnaces in the United States consumed 36.017.000 gross tons, or 49.1 per cent, of scrap and 37.359.000 gross tons, or 50.9 per cent, of pig iron. In the cupolas of the United States the ratio of scrap to pig iron consumed was 64.3 per cent to 35.7 per cent, and in the electric furnaces, 98.4 per cent and 1.6 per cent, respectively. For the steel industry of the United States, in all types of furnaces, the consumption of scrap in 1941 was 54.446.000 gross tons and of pig iron 50.328.000 gross tons.[107]

Justified inferences that may be made, based on the above data are 1.) that the Argentine steel manufacturers had on hand ample reserves of No. 1 heavy melting steel scrap, the optimum kind for open-hearth furnaces, since Argentina has the largest rail net in South America, and 2.) that, on the whole, generalizing on only one year, 1941, the Argentine steel

---

[105] Estadística Industrial de 1941, op. cit., pp. 307-311, passim.

[106] Anuario del Comercio Exterior de la República Argentina, 1941, op. cit., p. 286.

[107] Institute of Scrap Iron and Steel Yearbook, op. cit., pp. 29-31.

TABLE XIV

CONSUMPTION OF FERROUS SCRAP IN THE ARGENTINE IRON AND STEEL INDUSTRY, 1941*

Subgroup	Total Iron (1) Tons	Scrap Iron Tons	Total Steel Tons	Scrap Steel Tons	% Scrap of Total Ferrous Materials
1. Iron & steel, smelted, rolled, & fabricated into finished prod.	149,380	75.504	3.776	2.183	92.7
2. Finished products of tin plate, esp. containers	2.572	..	..	..	..
3. Construction materials	15.040	..	89	..	..
4. Finished prod. of iron	8.712	2.460	652	..	3.0
5. Kitchen ranges & heating units	4.090	193	..	..	0.3
6. Galvanized iron, esp. sheets	17.165	..	..	..	..
7. Bolts, screws, rivets, & nails	2.680	..	..	..	..
8. Rural prod. wire mesh, vats, tanks	2.248	..	..	..	..
9. Safes & metal furniture	2.991	..	..	..	..
10. Iron & steel pipes, esp. cast iron	4.489	3.367	..	..	4.0
11. Beds of iron & brass	3.366	..	..	..	..
12. Hardware for doors, windows, furniture	1.685	..	..	..	..
13. Wire, esp. stranded & galvanized	(2)	(2)	(2)	(2)	(2)
14. Platform & other scales	750	..	..	..	..
15. Iron worked in various forms	(2)	(2)	(2)	(2)	(2)
Total	215.168	81.524	4.517	2.183	100.0

*Estadística Industrial de 1941, op. cit., pp. 307-311, passim.

Note: (1) includes iron in sheets, sections, black sheets, galvanized sheets, but does not include wire, hoops, & pipes; (2) no data available.

industry consumed a smaller proportion of ferrous scrap in relation to other ferrous raw materials used, than did that of the United States, thus implying that the Argentine steel industry had in that year unused capacity from the point of view of its scrap reserves. Scrap alone could have almost met the raw material requirements for the Nation in 1941 (consumption requirements 600.000 tons and reserves of scrap 500.000 tons).[108] By 1943 the estimated national consumption of iron and steel products and the scrap reserves were closely similar figures (300.000 tons and 304.000 tons, respectively). The reserves, if depleted, could rapidly be restored at the end of a not-too-long war when the import of pig iron and capital goods would once again return to normalcy.

The use of scrap iron and steel by the various subcategories of the iron and steel industry in Argentina is interesting. Only four of the subgroups consumed ferrous scrap in 1941. By far, the largest portion, 92.7 per cent, was used by the iron and steel plants which smelted, rolled, and fabricated finished forms of steel. The foundries, rolling mills and steel works were, therefore, the chief consumers. The remainder, 7.3 per cent, was utilized by manufacturers of iron and steel pipes, especially cast iron pipes (4.0 per cent), finished products of iron with or without other metals (3.0 per cent), and kitchen ranges and heating units, excluding electric units (0.3 per cent).[109]

---

[108] Por otro parte, si tal cantidad de desechos o hierro viejo o chatarra, se emplea exclusivamente para abastecer el consumo que demanda la industria siderúrgica nacional, el "stocks" supuesto permitirá trabajar durante varios años con el máximo de capacidad y producción de las hornos para la fabricacion de acero, existentes a la fecha, suplienda así en parte, el déficit de la importación que pudiera existir y se mantendría en funcionamiento una industria básica para el Estado. Garimaldi, op. cit., p. 386.

[109] According to Garimaldi, 40 per cent of the scrap were charged into open-hearth furnaces (that represented 90 per cent of the siderurgical production of the country), another 40 per cent were used in the cupola furnaces, and the remaining 20 per cent were utilized by all other forms of smelting. Garmaldi, op. cit., p.391.

In the United States there are many small steel processing plants, that consume pig iron and ferrous scrap, located in places at great distances from the raw steel producing centers or from sources of iron ore. In reality they are freed from original sources of raw materials. The accusation is sometimes made that such small steel producing plants in outlying areas are not material-oriented plants. They are so oriented, however, in respect to scrap iron and steel, which is their basic raw material, and to local supplies of fuel.[110]

The small steel plants in Argentina, of which there are many, are in a similar position to those in the United States, in that they too are freed from the original sources of primary raw materials and depend on imported pig iron and on domestic scrap and fuel oil.

The pull on industry of available scrap materials is toward consumption areas and processing centers, since it is in these areas that most scrap materials are available in the form of industrial by-products and obsolescent capital and consumer goods. This principle may be accepted as one of the fundamental forces causing such a heavy concentration of Argentine iron and steel plants in the Central Agglomeration, and more specifically in Greater Buenos Aires.

The availability of scrap materials tends to decrease the connection between the location of manufacturing and sources of primary raw materials.[111] As long as an economic basis of exchange prevails with countries such as Brazil and Chile, and the present interchange of commodities is economic, one may expect an iron and steel industry to thrive, since certain quantities of pig iron can be imported conveniently, supplemented by ferrous scrap

---

[110] National Resources Planning Board, Industrial Location and National Resources, op. cit., p. 145.

[111] Ibid., p. 149.

accumulating in the country.

Assumptions concerning fuels.--It has been mentioned before and it will bear repeating that the industrial censuses do not furnish any data below the major categories of manufacturing pertaining to the fuels and lubricants consumed. It is necessary, therefore, to postulate certain generalizations concerning the use of fuels in the Argentine iron and steel industry based on the type of fuels commonly used in similar plants elsewhere. For example, coke is the fuel most desirable for use in foundries, while open-hearth furnaces are usually heated with natural gas, fuel oil, or producer gas. Billets and slabs, for the manufacture of strip steel, are preheated in automatic, gravity-discharge furnaces which are heated by powdered coal, producer gas, and fuel oil before they are worked in the rolling mills.

Since there are numerous small foundries, some open-hearths and rolling mills and electric furnaces in Argentina, the fuels needed, then, are coke and coal, natural gas, fuel oil, or producer gas. It is impossible to say in what proportions they are consumed by the various operations in the Argentine mills.

As of 1941 the metals industry, taken as a whole, consumed 40.626 tons of fuel oil, 15.843 tons of coke, 12.603 tons of wood, 8.201 tons of gas oil and diesel fuel oil, 3.514 tons of fine coal and blacksmith coal, 3.392 tons of coal, and 1.425 cubic meters of naptha and kerosene. Of these fuels some increased in tonnage consumed between 1937 and 1941 (fuel oil, coke, wood, gas oil and diesel oil, and naptha and kerosene), while others decreased in quantity consumed (fine coal and blacksmith coal, and the general category of coal).

One may assume that the iron and steel industry, the largest brach of the metallurgical industry, conformed to the same tendencies in fuel

consumption as did the entire metallurgical industry because the iron and steel industry accounted for two-thirds of the total number of plants and three-fourths of the total value of production of the metals industries. Hence, the iron and steel mills consumed large tonnages of fuel oil and smaller tonnages of coal and coke, wood and gas oil and diesel oil, and much smaller quantities of fine coal and blacksmith coal.

Almost all the coal and coke, and some of the fuel oil and diesel oil were imported. The largest quantity of fuel oil and diesel oil, kerosene, and wood were, however, of domestic origin.

Like coal, coke was normally imported from Europe, 30.000 to 40.000 tons annually, chiefly from England and Germany, and smaller amounts from Poland and the Low Countries. The war changed all this and Argentina had to depend upon the United States, United Kingdom, and the Union of South Africa as sources of coal and coke between 1941 and 1943.

Coke is the fuel used in the foundries of Argentina. The larger plants, that had built up reserves, were able to continue operations. The small plants, moreover, either because of lack of capital or foresight, lacked reserves and had to curtail operations.[112]

As time went along coke had to be substituted with fuels of national origin. The direct utilization of charcoal in cupolas was the first recourse. Apart from the difficulties of acquiring the charcoal, it presented certain problems in charging the furnaces. It is impossible to obtain as high a temperature as with the use of coke, and thus the quality of steel is lower. In addition, an establishment specialising in malleable iron, had to install a special type of cupola that would function properly with

---

[112] Articulo preparado por la Dirección de Siderúrgia y Metalúrgia. Boletín de la Secretaria de Industria y Comercio, Numero 1 - Año 1 (Octobre de 1944), pp. 116-117.

the use of charcoal.[113]

Later experiments had to do with the use of petroleum coke and national asphaltites. These fuels have a high percentage of volatile matter, which complicates the process in the cupola. Petroleum coke, even though it lacks uniformity of structure and composition as sold from the refineries, in general, is an excellent fuel due to its porous structure, its ease of combustion and its high calorific value, as well as its relatively low content of ash and sulphur.[114]

Hypotheses concerning markets.--About two-thirds of the Argentine iron and steel industry, according to the value of production in 1941, were characterized as belonging to the finishing stages of manufacture. Considering the nature of the fabricated articles it is obvious that most of these products were ready for the consumer's market upon leaving the mills. The products from the remaining third of the industry were classified as industrial raw materials for other industries. A very small export trade (only 1.4 per cent of the total production in 1941), but a growing export trade has developed between 1937 and 1943.

Goods destined for consumer's market.--Certain manufactures of iron and steel are easily recognized as output from the final stage of processing and ready for the consumer without further work being done on them. In 1941 these were: containers made of tin plate ready for the food-processing plants; doors, windows (and hardware for same) and lattice for construction work; kitchen ranges and heating units for the home and for construction purposes; bolts, screws, rivets and nails; wire mesh, vats, tanks for use on farms and ranches; safes, and metal furniture for office, hospital, and home

---

[113] Boletin de la Secretaria de Industria y Comercio, op. cit.

[114] Ibid.

use; iron and steel pipes for oil mining; and galvanized wire, galvanized iron sheets, platform and other scales, and iron beds for various purposes not necessary to mention.

Most of the manufactured products of the iron and steel industry (98.6 per cent of the total) were consumed by the domestic market, of which Greater Buenos Aires absorbed the largest portion.

Products as raw materials for other industries.--The first subcategory of iron and steel manufacturing[115] is unique in that it was the only subgroup that turned out chiefly semifinished products destined to be the industrial raw materials for other industries. The output from these mills consisted of: iron and steel worked in columns, trusses, windows, framework; iron and steel in bars, plates, sections L.T.U.Z., and beams; steel cast or elaborated in various forms; sanitary articles of cast iron; iron drums; boilers; and many others.

Inasmuch as there was an accelerated pace in building construction - expanding plants, new homes and apartments, and in petroleum mining and refining as well, one may venture that some of the above mentioned products were readily marketed for such purposes as these. The sheets may have been advanced further into galvanized sheets or black plates for tinning. The beams and sections L.T.U.Z., are structural shapes and might also have been further treated with a coating for use in bridge work and other construction. On the whole plates, shapes, bars, sheets, and forgings must be further fabricated. They lose their identity in such finished products as buildings, ships, automobiles, machinery and motors, tools, and many others.

Exports of iron and its manufactures.--Table XV presents the picture of the export trade in iron and steel commodities from Argentina between 1937

---

[115] See Appendix Table 7.

TABLE XV

ARGENTINE EXPORTS OF IRON AND ITS MANUFACTURES*
(Market Value)

Year	Industrial Raw Materials	Iron Worked In Other Forms	Various Other Finished Articles	Total Exports
	Thousands of Pesos			
1937	385.1	319.2	928.0	1.632.3
1938	294.9	328.0	609.1	1.232.0
1939	462.8	356.7	854.2	1.673.7
1940	295.0	532.4	1.225.0	2.052.4
1941	97.0	607.4	2.842.9	3.547.3
1942	11.3	337.7	3.553.1	3.902.1
1943	318.5	1.269.0	10.882.4	12.470.3

*Anuario del Comercio Exterior de la República Argentina, op. cit., 1938, pp. 456-63; 1940, pp. 439-46; 1942, pp. 429-36; and 1943, pp. 412-19.

and 1943. The total exports showed a gradual increase between 1937 and 1942, but a steep rise between 1942 and 1943 (Fig. 6). The export of industrial raw materials ascribed a cyclical curve between 1937 and 1943, being lowest in 1941 and 1942. Iron worked in various forms, and the distinctly finished products of iron and steel, the major classes of exports, both showed a gradual increase with almost a 30 per cent rise between 1942 and 1943.

The destination of the Argentine iron and steel exports, especially to the La Plata Bloc of nations, is also worthy of note. In 1941, Bolivia received 21.7 per cent, Chile 16.3 per cent, Paraguay 14.5 per cent, Colombia 10.6 per cent, Uruguay 10.2 per cent, Peru 8.4 per cent, Brazil 4.7 per cent, United States 4.2 per cent, Ecuador 2.6 per cent, Spain 1.2 per cent, and all others 3.3 per cent, of the total exports, by market value.

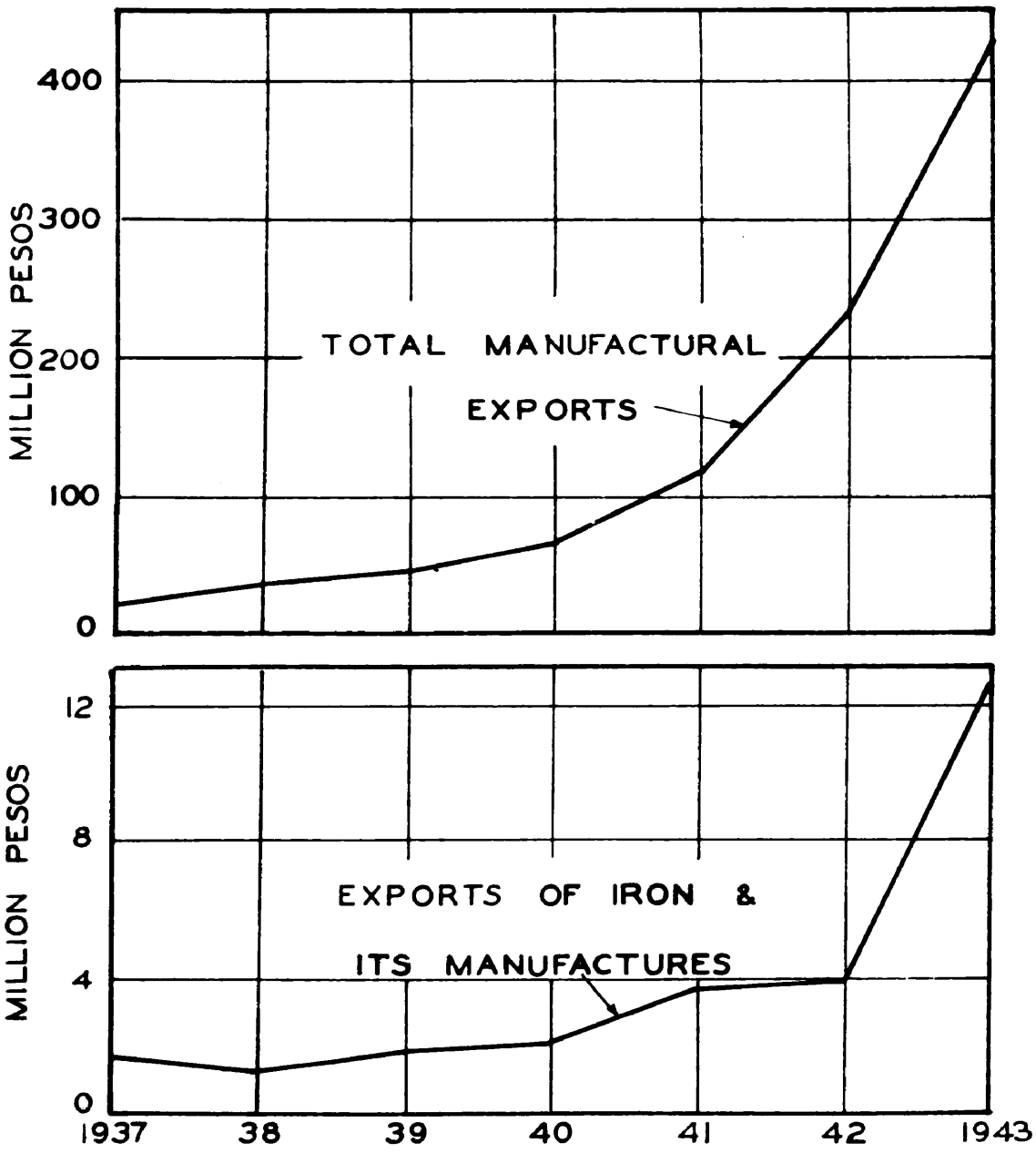
The chief destination of certain of the major manufactured iron and steel goods in 1941 is worth mentioning. For instance, household articles of wrought iron went principally to Colombia, sanitary wares of wrought iron were destined mostly to Chile as were iron fittings and ornamental iron. Iron beds and cots, doors, windows, screens, and other articles for construction, and iron cooking ranges were shipped chiefly to Bolivia. Paraguay was the chief export market for water tanks and iron and steel valves, while the United States received more than half of the exports of casks and barrels of iron and cylinders or rollers of iron and steel.

The next subcategory of iron and steel exports, by market value, was iron worked in other forms (wire, galvanized iron bands, cast iron pipes, galvanized iron pipes, elbows, flaplates, bolts, nuts, nails, rivets, brads, and others). Paraguay was, by far, the leading market for most of these exports, with Brazil and Spain being the chief receiver for a few of them.

The export trade in semifinished manufactures of the Argentine iron and

FIGURE 6

ARGENTINE MANUFACTURAL EXPORTS



ANUARIO DEL COMERCIO DE LA REPÚBLICA ARGENTINA, 1938 TO 1943, OP. CIT.

steel industry showed similar trade lanes. Paraguay received more than half of the iron unworked in bars and plates, unworked iron in sections L.T.U.Z., tin plate, and galvanized iron sheets, but all of the iron hoops. Uruguay was the leading market for steel unworked in bars and plates, and Italy for pig iron.

The general marketing of iron and steel products in the neighboring countries of South America was due in part to the fact that all the nations were experiencing shortages of essentials as was Argentina, but with the exception of Brazil, their iron and steel industries were much less advanced than was that of Argentina. The quality of many of the products that were exported may not have been as high as that of the former products received from the United Kingdom and Western Continent, but at least, they were a good substitute. This very lucrative trade gave Argentina an opportunity to procure from other Latin American countries certain products which she had formerly received from abroad, such as small quantities of coal from Colombia, pig iron from Brazil, oil from Bolivia, and many others.

Summary

By way of recapitulation the Argentine iron and steel industry may be described as being an industry with certain outstanding geographic characteristics. It showed a marked concentration as to scale of production in 1941, that is, a few large firms aggregated the largest percentage of the total value of production. There was a significant geographic concentration wherein more than 90 per cent of the plants were located in Greater Buenos Aires. It was a semi-integrated industry inasmuch as it made no pig iron and began operations with the intermediary stages of fabrication, of which the large number of open-hearth furnaces, numerous foundries and a few electric furnaces were indicative. About two-thirds of the output, by value,

in 1941 were finished products ready for the consumer market, and approximately one-third was semifinished products, or industrial raw materials, requiring further processing in related industries. The normal consumption of iron and steel products was about 600,000 tons, while the average production was about 80,000 tons in 1941. The tonnage deficit in production was met largely by imports, upon which ad valorem duties were levied based on a fixed official valuation. Raw materials came in either free or with low duties and the manufactured articles paid a higher duty; and in many cases the additional transitory duty of 10 per cent. The import trade in iron and steel products was largely regulated by a system of exchange control whereby the Exchange Control Board issued permits to importers depending not only on the nature of the commodity to be imported, but also on the country of origin. Tonnage steels from Great Britain and the Western Continent were preferred to United States steels. Imports in 1941 consisted largely of industrial raw materials (pig iron, coal and coke, and fuel oil) and semifinished ferrous products. In that same year the imports originated mostly in United States, United Kingdom, Sweden, Japan, Brazil, Canada, Spain and Portugal. There was a small, but expanding export trade which developed between 1937 and 1943, the products being sold chiefly to South American countries.

Still other outstanding characteristics of the iron and steel industry in Argentina may be summarized. The consumption by the iron and steel industry of raw materials of domestic origin doubled between 1937 and 1941, while the utilization of raw materials of foreign origin increased by one-third. The domestic industry in 1941 was based largely on domestic scrap and fuel oil, and on imported pig iron and semifinished raw materials, coke and coal. There was, in that year, an absence of metallurgical coal in Argentina, and of commercial iron ore deposits accessible to the older

centers of industry. Most of the fabricated articles were sold in the domestic market to individual consumers and to industrialists manufacturing farm machinery, machines, tools, and to building contractors. Further development of the Southern Customs Union took place in order to overcome the handicap of a small home market. And lastly, the Argentine iron and steel industry was distinctly market-oriented and material-oriented, the latter referring to the large proportion of domestic scrap consumed.

CHAPTER III

RATIONALIZATION OF THE ARGENTINE IRON AND STEEL INDUSTRY

> ....con el objecto de encarar la producción sobre, bases concretas, es necesaria la racionalización previa de los materiales y elementos que intervienen en el proceso de fabricación, lo que es, en efecto, la primera etapa de una siderurgia nacional racional.[1]

Essentially, the purpose of this chapter is to present a geographic description and interpretation of these primary raw materials necessary for establishing a basic iron and steel industry in Argentina. Only by facing reality may one hope to render a scientific opinion.

There will follow, first, a discussion of the theoretical aspects of the location of iron and steel centers; second, a résumé of the mineral fuels and power resources in Argentina; and third, an over-view of the ferrous and alloying materials present in the Argentine subsoil.

Theoretical Aspects of Location of the Iron and Steel Industry

Three factors are of major purport in determining the location of an iron and steel industry, namely, iron ore, coal, and markets, but no generalization is possible concerning the relative weights of these factors. The importance of ore and coal depends largely on the coal-ore ratio in the production of steel, and this is related, in turn, to the quality of the ore and the technological improvements. The pull of raw materials compared with that of markets varies with the comparative cost of transporting raw materials and finished products.[2]

The ideal combination is to be found in a region which has iron ore

---

[1] de Nardo, op. cit., p. 155.

[2] Carter and Dodge, op. cit., pp. 439-444.

deposits, coal mines, and a large market. Birmingham, Alabama and the Cumberland district in England are good examples.

The most common combination of these factors is that of coal mines and markets with iron ore shipped in. The Pittsburgh-Cleveland area in the United States, and the countries of Great Britain, Germany, China, and the Belgium-Luxemburg Customs Union were illustrations of this phase of location.

Iron ore deposits near markets with coal shipped in is characteristic of such regions as the Loraine area of France, and to a certain extent of certain countries as Italy, Japan, India and Brazil.

When markets, coal fields, and iron ore deposits are all separated, the iron and steel center will develop about the factor intermediate as to location. The South Chicago-Gary district is close to a large market, but in between the coal and ore deposits. Argentina, also, falls into this category since her industry is distinctly market-oriented.

There are secondary factors that determine plant location which are: cheap land, low taxes, ample water supply, much capital, good transportation facilities, much labor, and governmental factors. No discussion of these criteria will ensue since this dissertation is not meant to be a treatise on plant location, but rather an evaluation of the possibilities of Argentina, considered as a geographic region, becoming an iron and steel manufacturing center of sufficient proportions to adequately meet her home needs. By so doing she can diversify her economy, increase employment and purchasing power, and raise the standard of living of her people.

Résumé of the Fuel and Power Resources In Argentina

The problem of meeting the national fuel needs has always been one of great magnitude for the Argentines. While there are present in the country

large reserves of petroleum, the coal deposits are of low grade and remotely situated from the present centers of industry and population. Imported coal and coke, and fuel oil have been called upon, over a period of years, to supply the deficit in fuel needs.

Argentine industrialists are playing a particularly admirable role in their efforts to expand the heavy industries since there remains the ever-present problem of maintaining an adequate and reliable supply of fuels. By no means were the basic industries of the Nation in 1941 the largest consumers of fuels and lubricants, or of purchased electric energy. This truth mirrors the early stage of development of such industries if gauged by the fact that the heavy industries in the most advanced industrial nations of the world today are the chief consumers of combustibles.

Fuels.--The magnitude of the problems associated with the acquisition of fuels and lubricants needed by the consuming public may be readily ascertained through the interpretation of a series of tables and graphs. Table XVI shows the fuels and lubricants that were produced, consumed, imported and the resultant deficit between production and consumption, by the Nation from 1937 to 1942, inclusive. Production and consumption of all fuels showed an increase, while the importation of these commodities showed a progressive decline. The Nation's deficit of national production also showed a decreasing ratio, this being due largely to the step-up in domestic production of petroleum and its replacement of a large portion of the coal consumption over a period of years.

In 1941 almost half of all the fuels consumed (expressed as equivalent

TABLE XVI

NATIONAL CONSUMPTION OF FUELS AND LUBRICANTS IN ARGENTINA
For the Years 1937 to 1942*

Item	1937	1938	1939	1940	1941	1942
	Millions of Calories					
Production	55.470	59.570	57.309	61.809	76.969	93.605
Importation	39.123	41.101	39.268	33.547	25.062	12.831
Consumption	94.593	100.672	96.577	98.356	102.031	106.436
Deficit in per cent of consumption	41.0	41.0	41.0	34.0	25.0	12.0

*Dorfman and Olives, op. cit., p. 117.

petroleum tons)[3] was petroleum, about one-third was wood, charcoal and residues, and the remainder consisted of coal, natural gas, and other miscellaneous combustibles (Table XVII). Of the residues utilized in that year, corn on the cob, bagasse, and cereal straw were the most commonly used, and accounted for more than 85 per cent of the total residues burned for fuel. Quebracho sawdust and chips, oil seed hulls, and oil seed pressed cake and flour, and others were of lesser importance. The total consumption of residues, expressed as equivalent petroleum tons, amounted to 1.407.000 tons (Table XVIII).

The trend in the Nation's consumption of fuels (Fig. 7) indicates that the fuel consumption has doubled between the years 1922 and 1941, amounting to more than 10.000.000 tons in the latter year. This has been due in large measure to the increased use by industry, since the consumption by the railroads, increased only slightly from 1.397.000 tons in 1922 to 1.790,000 tons in 1941, while the fuel consumption for all other purposes - industry, automobiles, domestic, and others rose from 3.866.000 tons in 1922 to 8.574.000 tons in 1941.[4] Industry alone, in 1941, consumed 44.9 per cent of the total fuel consumption of the country.[5]

Considering now the contribution of each fuel type to the total fuel

---

[3]The calorific equivalent in petroleum tons is: petroleum - 10.500 calories per kilo, coal - 7.500, charcoal - 7.500, wood - 3.500, respectively, and natural gas - 7.700 calories per cubic meter. For the residues: bagasse - 2.000 calories per kilo, corn on cob - 3.000, cereal straw - 2.800, oilseed hulls - 3.000, quebracho sawdust - 1.800, sawdust burned in sawmills - 3.000, grape skins - 2.800, alcohol - 6.000, and other residues 2.000, respectively. Instituto de Estudios Economicos del Transporte. El Consumo de Combustibles en la Argentina en los Ultimos 20 años y Actuales Perspectivas. (Buenos Aires: 27 de Junio de 1942), p. 4.

[4]Ibid., p. 13.

[5]Pedro J. Cristia, Argentina Economica e Industrial (Rosario: 1944), p. 83.

TABLE XVII

CONSUMPTION OF FUELS IN ARGENTINA, 1941
By Types of Fuel*

Kind of Fuel	Equivalent Petroleum Tons	Per Cent of Total
Petroleum	5.088.000	49.1
Wood and charcoal	2.113.000	20.4
Residues	1.737.000	16.7
Coal	991.000	9.6
Natural gas	435.000	4.2
Total	10.364.000	100.0

*Instituto de Estudios Economicos del Transporte, op. cit., p. 12.

TABLE XVIII

CONSUMPTION OF RESIDUES FOR FUEL IN ARGENTINA, 1941*

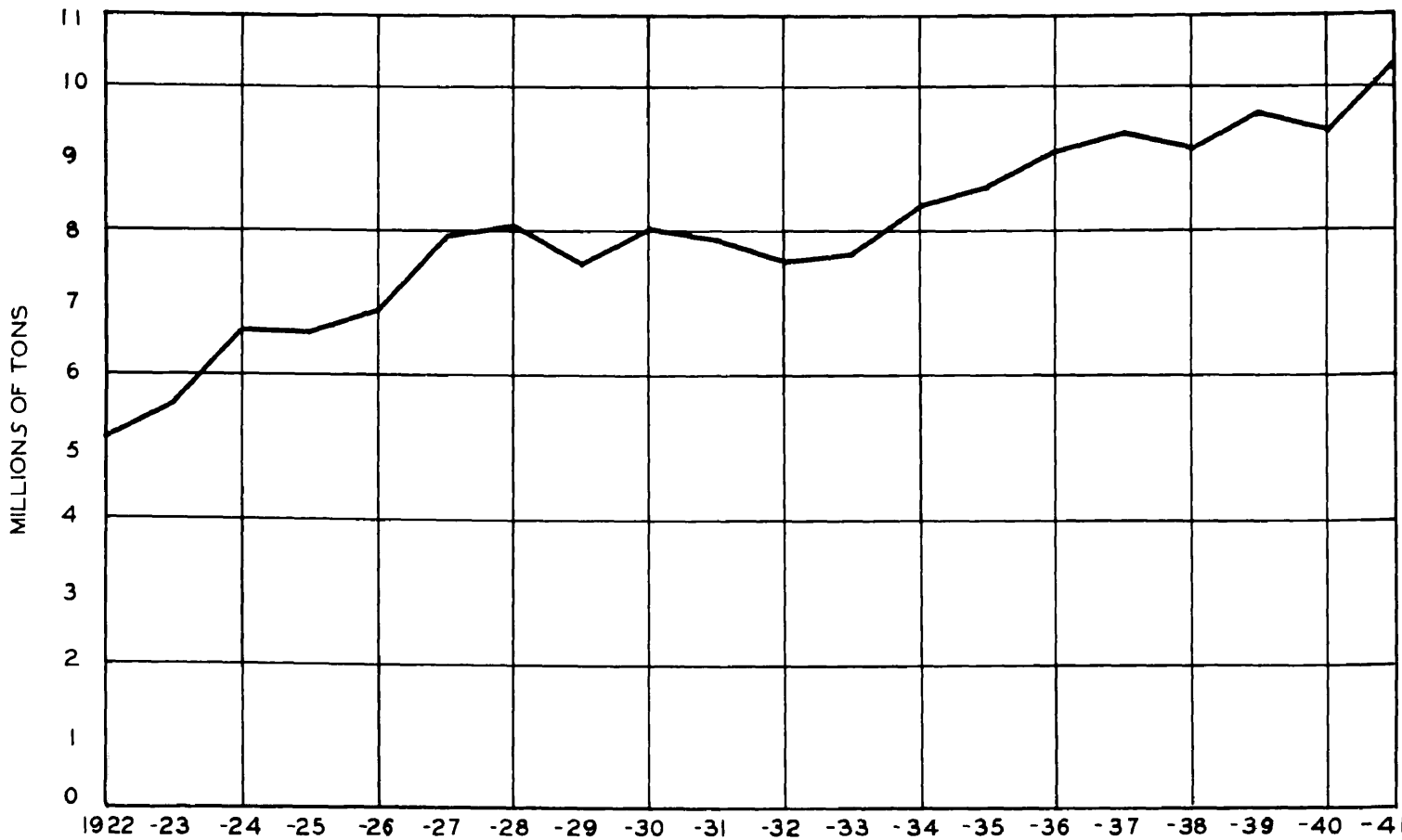
Type of Residue	Equivalent Petroleum Tons	Per Cent of Total
Corn, cob	608.000	43.2
Bagasse	286.000	20.3
Cereal straw	278.000	19.8
Quebracho sawdust & chips	71.000	5.0
Oil seed hulls	60.000	4.3
Oil seed pressed cake & flour	53.000	3.8
Sawdust, general	14.000	1.0
Grape skins & waste	11.000	0.8
Alcohol	7.000	0.5
Rice hulls	6.000	0.4
Miscellaneous	13.000	0.9
Total	1.407.000	100.0

*Instituto de Estudios Economicos del Transporte, op. cit.

FIGURE 7

CONSUMPTION OF FUELS IN ARGENTINA

IN EQUIVALENT PETROLEUM TONS



INSTITUTO DE ESTUDIOS ECONÓMICOS DEL TRANSPORTE, OP. CIT., P. 11.

consumption of the Nation for each year some interesting observations may be drawn (Fig. 8). The consumption of petroleum has almost doubled between 1922 and 1942, in all probability due to the increased utilization by industry, as will be pointed out later. Coal consumption remained rather constant from 1922 to 1935, then took a steep downward swing. Shipping shortages caused by the Second World War, and the step-up in industrial production in countries normally exporting coal are plausible explanations. Wood consumption, normally about 10 per cent of the total fuel consumption has also remained rather steady, but showed an increase in the early twenties and again in the early forties due undoubtedly to economic pressure on the fuel supply in general. The use of charcoal, on an average amounting to only some 5 per cent of the total fuel consumption, has declined in accordance with the wishes of those conservationists who are aware of the rapid depletion of forests of the country. Natural gas has augmented its contribution to the total fuel demands (Fig. 8), although it, too, furnished less than 5 per cent of the national fuel needs. The residues which have received undue emphasis as augmenting the reduced stockpiles, caused by the shortage of imported fuels, in reality held a rather steady position in their percentage contribution to the national supply of energy over a period of two decades. In fact, there has been a gradual downward trend in their contribution to the over-all fuel consumption.

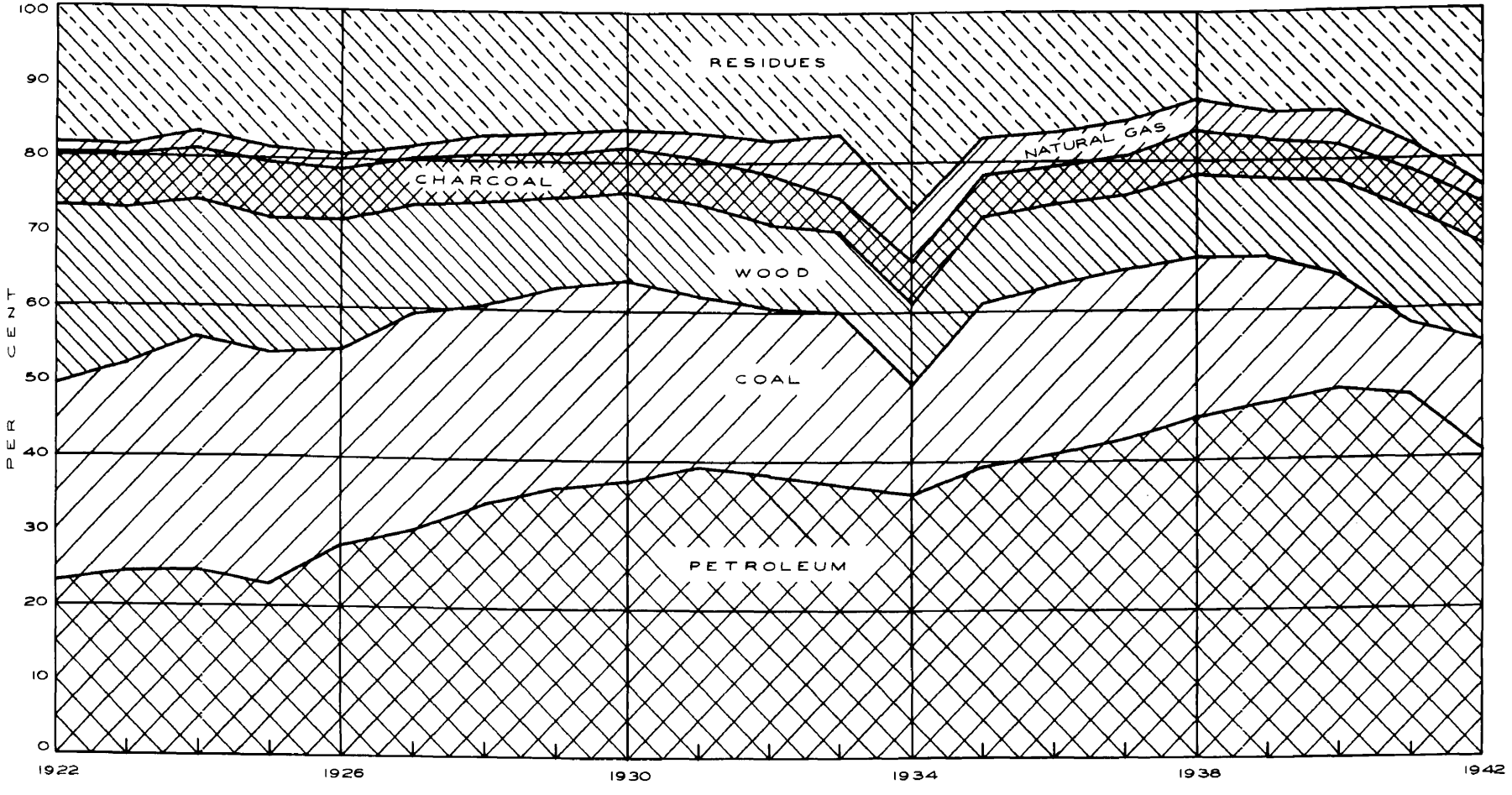
The tonnage of residues consumed has remained fairly constant, oscillating slightly around 1.000.000 tons from 1923 to 1940, with an increment of approximately 300.000 tons in 1941 and 1942, amounting to a total consumption in those years of about a million and a half tons.[6] It is not the intention to minimize the significance of the residues that have been utilized as

---

[6] Instituto de Estudios Economicos del Transporte, op. cit., p. 10.

FIGURE 8

CONSUMPTION OF FUELS IN ARGENTINA



REVÍSTA DE ECONOMÍA ARGENTINA, (AGOSTO, 1943) OP. CIT., P. 328.

combustibles, but rather to state that their contribution to the total fuel situation has not been accelerated appreciably by the disturbed world economic conditions as some would have us believe. There have always been residues of economic calorific value from such industries as the refining of sugar, the production of quebracho logs, the preparation of cereals for export, the wineries, the making of linseed oil and others. Burning of residues by such industries has long been a common practice in Argentina, especially by those industries situated in the interior remote from cheap imported fuels or nationally produced fuels entailing a long haul.

In their industrial uses, the energy resources often compete with one another and may be substituted one for another. A change in the utilization of fuel for energy has resulted in those industries that were depended largely on imported coal and fuel oils. The fuel situation is well summarized in the following paragraph:

> They are not suffering nor will they suffer those sectors of production and of transport that utilize energy produced by residues, firewood or charcoal, nor those that without great inconveniences can substitute petroleum or coal for the mentioned combustibles, or better yet corn, flax or linseed. But the perspectives are alarming, in those cases in which more or less an appreciable part of the fuels used have necessarily been coal or petroleum (fuel oil, diesel oil and gas oil). The decrease of the disposable stockpiles by importing them, is coincidental with the constant industrial development. And a large part of the industries utilize electric power, whose production requires inevitably a determined proportion of coal and petroleum. In the same manner, the railroads require also a determined minimum of these two fuels. With the drop in the importation of these two fuels below the minimum essentials (not substitutible with others) serious methods of rationing in various sectors will take place for the direct or indirect consumption of petroleum and coal.[7]

The Argentine manufactural industries utilized about 110,000,000 pesos worth of fuels and lubricants in 1941. Of the industrial groups, foodstuffs, ceramics, textiles, metals, chemicals, and machinery were the largest users, named in descending order (Table XIX). The same table also indicates that

---

[7] Instituto de Estudios Económicos del Transporte, op. cit., p. 24.

TABLE XIX

CONSUMPTION OF FUELS AND LUBRICANTS AND PURCHASED ELECTRIC CURRENT IN ARGENTINA, 1941
By Industrial Groups*

Industrial Group	Fuels & Lubricants Consumed T. Pesos	Purchased Electric Current T. kwh
Foodstuffs	37.171	166.146
Textiles & mfrs.	8.832	147.060
Machinery & vehicles	5.695	43.075
Metal mfrs. (exc. mach.)	8.732	47.189
Forest prod. & mfrs.	1.052	12.247
Chemicals & mfrs.	7.631	43.524
Printing & publ.	408	20.618
Leather & mfrs.	932	12.846
Ceramic products	27.848	39.429
Paper & mfrs.	3.510	50.410
Rubber mfrs.	1.397	26.736
Miscellaneous	6.186	47.184
Total	109.594	656.413

*Estadística Industrial de 1941, op. cit., pp. 64-67 and 151.

foodstuffs and textiles were the largest users of purchased electric current using about half of the total kilowatt-hours consumed by manufacturing industries as a whole. Paper, metals, chemicals and machinery ranked next in order in the consumption of purchased electric current.

Further details are available as to the industrial groups that were the largest consumers of the various fuel types in 1941.[6] In considering these data one must keep in mind the relative position of these various industrial groups to the whole manufactural picture as was clearly pointed out in Chapter I. A further geographic fact of great purport must also be considered, namely, the structure of the manufactural process as to its utilization of fuels and lubricants. Ceramics was the largest user of fuel oil, with foodstuffs, textiles, chemicals, metals and paper following in lower order. Of the utilization of gas oil and diesel fuel oil, foodstuffs held first place, with ceramics, metals, machinery, textiles and chemicals coming next with smaller amounts. Machinery, foodstuffs, metals, forest product industries, ceramics and textiles, in ranked order, used most of the naptha and kerosene. Of coal, foodstuffs absorbed the largest tonnage, and next in order were ceramics, chemicals, machinery, metals and forest products. Industries showed a different preference as to their use of coke. Ceramics used most of the imported coke, with metals, foodstuffs, machinery and chemicals using smaller quantities. Fine coal and blacksmith's coal was of prime value as a raw material in the ceramics industry, with machinery and metal industries also consuming a good deal. By far, the greatest tonnage of wood was burned in the plants manufacturing foodstuffs and ceramics. The chemical, machinery, forest products and textile industries also consumed small amounts of wood.

---

[6] See Appendix Table 10.

By way of synthesizing these data a comparison may be made of the tonnage of fuels consumed by certain industrial groups. Chemical and allied products industries used chiefly fuel oil, wood, coal and gas oil and diesel fuel oil; the industries engaged in the fabrication of metals and manufactures consumed mostly fuel oil, coke, wood and gas oil and diesel fuel oil; and lastly, the machinery industries used large amounts of wood and fuel oil. In other words, the heavy industries in Argentina showed a preference, in 1941, for fuel oil and wood as sources of combustibles. One may conjecture with some safety that inasmuch as Argentina's industrial efforts have been of recent date, the machinery installed is well adapted to the utilization of the more modern fuel type, that is, oil. If this be the case, then, it is highly significant that the Nation assure itself of having reliable and dependable sources of petroleum, either at home or abroad.

Some verification of the above assumption may be read from Table XX. In 1922, imported coal was the chief source of fuel consumed in the country, by tonnage, with wood or domestic origin and petroleum, largely of foreign origin, running a close second. By 1941, however, petroleum had come to the lead, accounting for almost 50 per cent of the total tonnage of fuel consumed. An additional clue, as to the reason for this shift in emphasis from coal to oil, may also be had from this same table, namely, that while petroleum of national origin amounted to only one-third of the total percentage of fuel consumed in 1922, it constituted two-thirds of the entire percentage of fuel consumption two decades later.

Just a word about the origin of the imports of fuels and lubricants in 1941. The total importation of combustibles, for the year 1941, was valued at 145.392.000 pesos (tariff value). Of that total, petroleum and derivatives contributed 119.586.000 pesos, coal and coke 27.229.000 pesos,

TABLE XX

CONSUMPTION OF FUEL TYPES IN ARGENTINA
for the Years 1922 & 1941
By Origin*

Fuel Type	Equivalent Petroleum Tons T. Tons	National Origin	Foreign Origin
		Per Cent	
	For the Year 1922		
Petroleum	1.246	33.6	66.4
Residues	639	100.0	..
Wood	1.294	100.0	..
Coal	1.371	..	100.0
Charcoal	317	100.0	..
Natural gas	65	100.0	..
Total	4.932	55.4	44.6
	For the Year 1941		
Petroleum	5.068	63.4	36.6
Residues	1.737	100.0	..
Wood	1.568	100.0	..
Coal	991	1.4	98.6
Charcoal	545	100.0	..
Natural gas	435	100.0	..
Total	10.364	72.6	28.4

*Instituto de Estudios Economicos del Transporte, op. cit., p. 22.

and lubricants 1.576.000 pesos. Next, considering the country of origin of those combustibles, about one-third of the total value was supplied by Peru, one-fourth by the Dutch Possessions in the Caribbean, smaller portions by Venezuela, United States, United Kingdom and Colombia, and diminutive amounts from Chile, Brazil, Bolivia, Union of South Africa, and others.[9]

In the category of petroleum and derivatives, crude petroleum was the largest imported item, by weight and by value, amounting to almost 500.000.000 kilos in the year 1941 and more than 72.000.000 pesos. Peru supplied almost half of the quantity of crude petroleum, Venezuela, Colombia and United States together furnished almost all the remainder. Fuel oil came chiefly from the Dutch Possessions in the Caribbean and Venezuela; diesel oil and gas oil originated in the Dutch Possessions; kerosene was imported from Chile; United States contributed the mineral oil; and gasoline and naptha came in from the United States and Dutch Possessions.

The United Kingdom supplied more than half of the coal with most of the remainder coming from the United States, and smaller quantities coming from Chile, Brazil and the Union of South Africa. The United Kingdom furnished the coal briquettes, while coke came in almost equal amounts from the United States and the United Kingdom, and wood chiefly from Chile and Paraguay, and a diminutive amount from Brazil.

Under the heading of lubricants, mineral greases were purchased largely in the United States and the United Kingdom and mineral oil lubricants in the United States.

Figure 9 is convincing in its presentation of the fact that Argentina

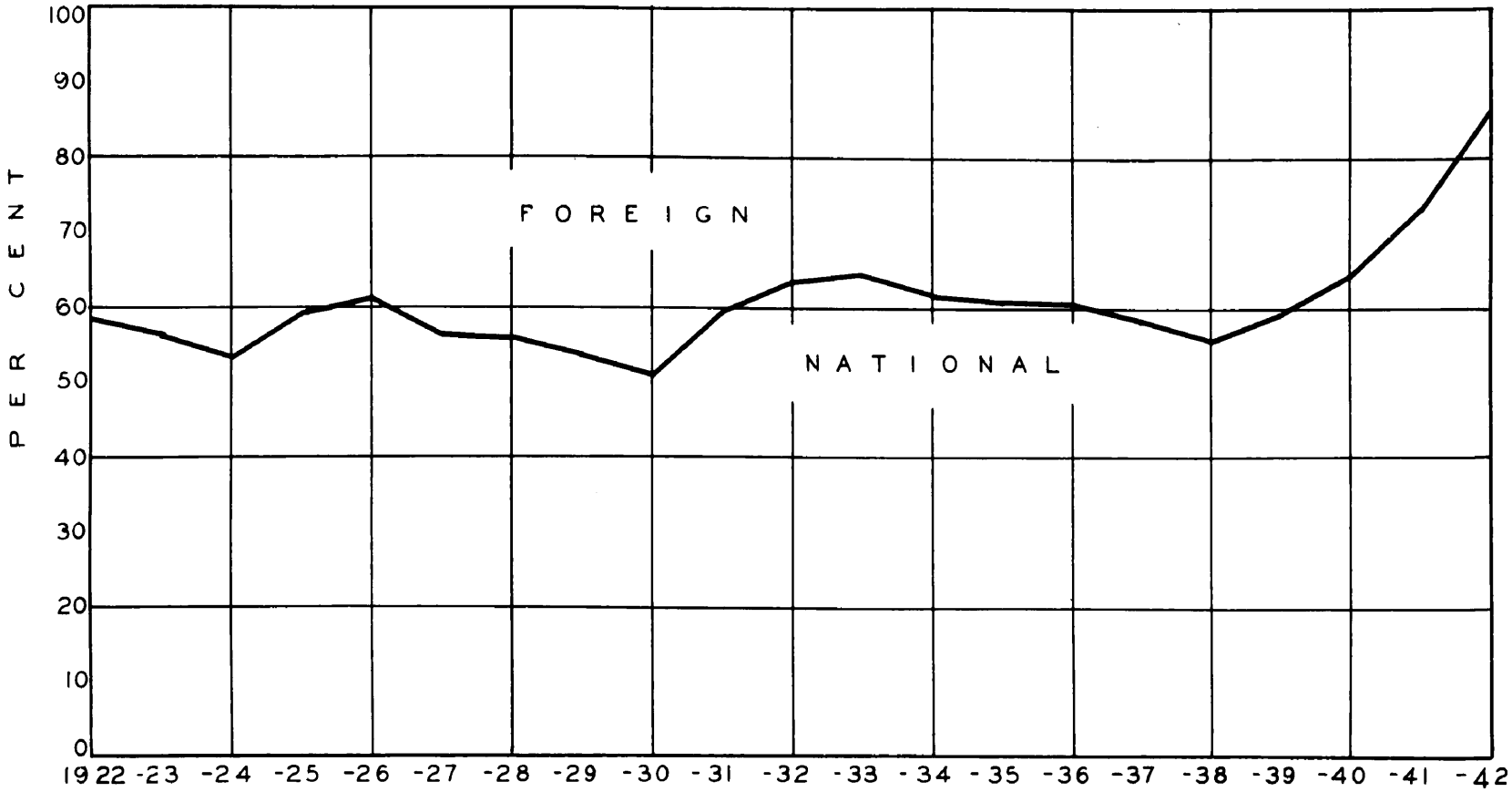
---

[9] Anuario del Comercio de la República Argentina, 1941, op. cit., pp. 142 and 352-3.

FIGURE 9

CONSUMPTION OF FUELS IN ARGENTINA

BY ORIGIN



REVÍSTA DE ECONOMÍA (AGOSTO DE 1943), OP. CIT., P. 334.

has increasingly drawn upon domestic sources of fuels, especially from the year 1930.

As to import duties, all the fuel oil, greases, and about half of the gasoline and mineral oil lubricants were subject to import duties. On the other hand, all diesel oil, gas oil, kerosene, mineral oils and coal were imported free of duty.

Petroleum situation.-[10] Petroleum was the most important fuel consumed in Argentina in 1941. It has been the most valuable of all minerals produced over a period of years. The Nation's rank in world production was rather high, being ninth in that year. The domestic wells were able to produce 85.7 per cent of the national consumption of crude petroleum, about three-quarters of which originated in the Comodoro Rivadavia district on the littoral in the Province of Chubut. The National Government has been interested in the petroleum industry since the discovery of petroleum in that region shortly after the turn of the century. In 1941 almost 70 per cent were fiscal production while the rest was produced by private enterprise. There were 360 new wells drilled in the country, in 1941, of which 303 were producing petroleum, 11 were gas wells and 46 were unproductive. Figure 10 shows the geographic allocation of the petroleum producing fields in 1941.

In the Comodoro Rivadavia district (Fig. 10, Inset), Zone B produced about 50 per cent of the petroleum in that year. It has produced the largest portion of the petroleum since 1937. The most marked increase between 1939 and 1941, however, was in Zone F by the well "El Trébol." The region as a whole is delineated geologically as Middle Cretaceous,

---

[10] República Argentina, Ministerio de Agricultura de la Nación, Dirección de Minas, Geología a Hidrogeología. Estadística de Petróleo de la República Argentina, 1941, Publ. No. 125 (Buenos Aires: 1942), and Foreign Minerals Quarterly, op. cit.

the rock formation having broad anticlinal and monoclinal structures extending for great distances. Productive formations are marked by very gentle folding and lensing of the sands, and possess differentiated porosity. There were 295 new wells drilled in 1941, 266 of which were productive, and of these 66 were deepened with good results. Exploration continued under the Government Petroleum Enterprise (Yacimientos Petrolíferos Fiscales), referred to in the literature as the Y.P.F.[11] The total value of production in 1941, from the 2.868 wells, was 70.914,000 pesos derived from 2.498.698 cubic meters of petroleum produced, or 71.1 per cent of the total domestic production.

Petroleum from the Comodoro Rivadavia region was shipped by tankers to refineries in La Plata, San Lorenzo, Campana and Buenos Aires (Fig. 10). The oil is ashpaltic of base with about 10 per cent of light products.

The Mendoza region, with 54 producing wells in 1941, in which the workings were carried on almost exclusively by the Y.P.F. contributed 15.2 per cent of the total national production, or a quantity of 531.672 cubic meters valued at 20.448.000 pesos. The region as a whole showed an increase of 33.16 per cent over 1940.

A very large increase in production, more than 400 per cent, took place in the Mendoza fields between 1939 and 1941. The Tupungato zone, a little to the northeast of a town delineated by the same name, has contributed the bulk of the production since 1939 when the discovery of a deep horizon occurred. The Tupungato zone supplied more than 55 per cent

---

[11] The Y.P.F. is a State-owned company organized in 1907 upon the discovery of oil by the Dirección de Minas. The Y.P.F. now has full rights to all the petroleum reserves in Federal lands in the country, and operates as a private company. It has its own geological and geophysical field staffs. It had over half of the producing wells and oil refineries as well as filling stations throughout the country. Foreign Minerals Quarterly, op. cit., p. 43.

of all the crude petroleum brought to the surface in the Mendoza district in the year 1941. The newer wells of the region, moreover, were drilled about 36 kilometers to the northeast in the zone "Lunlunta-Barrancas," in which the deepest horizon perforated was 2.890 meters. The new fields were discovered on well-developed dome structures, the oil coming from sands and shale. Because of the large consumption of fuel in the Mendoza district, crude petroleum from the Mendoza field was processed in the local Y.P.F. refinery. Private companies have been producing oil in the Mendoza district since 1926. The Y.P.F. entered in 1931 and is today the largest producer.

The "San Pedro" zone yielded more than one-third of the oil in the Province of Salta in 1941, and was the largest contributor from 1932 to 1942 (Fig. 10). The total production, in 1941, of all wells, 167 in number in the Salta fields, increased over 1940 by 1.84 per cent, but the fields contributed only 8.6 per cent of the national production. The producing formations range in age from Devonian to Tertiary. Beds of Permian age, perhaps of glacial origin which overlie the Devonian beds also occur. Much of the oil is found in two horizons of Tertiary age, but it is believed that the oil originated in the older beds and later migrated into the overlying formations during the intense folding and faulting of the late Tertiary age. Private companies produced the largest amount of petroleum from 1926, when the first well was sunk, until 1940. Since then, the Y.P.F. has been the major producer. The oil is of high quality and is shipped in tank cars to Buenos Aires for refining.

The Plaza Huincul region (Fig. 10) in the Territory of Neuquén supplied 4.8 per cent of the national production in 1941, or 170.306 cubic meters valued at almost 6.000.000 pesos from 318 wells. There was a decrease in production of 16 per cent from 1940 to 1941, equally shared

by the Y.P.F. and privately-owned companies. The region belongs to the Middle Cretaceous age and has a sandstone rock formation. The poor returns were believed to be due to the special characteristics of accumulation, the productive sector of the structure being relatively close, with the result also of an accentuated decline in production in the wells that have to be worked with gas-petroleum relation, and that are rapidly reached by the marginal waters. The Northern Patagonian field in the Territory of Neuquén is separated from Chubut by an old uplift of igneous rocks. The productive fields are due both to anticlinal accumulations and overlap. Zone 2 located in the western part of the field produced 70 per cent of the petroleum of the region in 1941, the best results being obtained in the west and southwest from the "Chita" well, in the westernmost part of that zone. From 1926 to 1938, however, zone 3 in the northeast belonging to the Y.P.F. has been the largest producer. There were 5 new wells drilled, 2 of which were dry, and 1 exploratory, in 1941.

The oil is shipped by tank car to the refineries in Bahía Blanca (Fig. 10). Since the first exploitations in 1918, the Fiscal production has surpassed that of private enterprise until 1927, when private companies took and held the lead until 1940 at which time the Y.P.F. again asserted itself.

The Province of Jujuy's production of 212 cubic meters of oil in 1941, all by the Y.P.F., corresponds to the well, "Saladillo de la Brea," 23 kilometers southeast of San Pedro (Fig. 10), in activity during the last four months of 1941.

The total production of the wells in Salta and Jujuy was valued at 14.437.000 million pesos in 1941.

Small quantities of petroleum were produced as early as 1882 near Mendoza, but production usually dates from 1907 when a well was drilled

by the Dirección de Minas at Comodoro Rivadavia which disclosed the presence of oil bearing sands at 365 to 609 meters in depth. From 1907 to 1915 exploitation was a State monopoly. In 1916 private companies, mostly foreign owned, entered, and by 1931 their production exceeded that of the Y.P.F.[12] See also Figure 11. Since 1924 a series of Decrees have been issued by which oil lands in nationally owned territories were reserved for exploration by the Y.P.F. These Decrees tended to limit the expansion of foreign owned oil lands.

In July 20, 1936 a Decree greatly limited the activities of private enterprise. The Y.P.F. controlled the trade and importation of petroleum, reserving for itself the Executive Power of fixing the import quotas on petroleum products according to the consumption and the production. The increase in consumption for that year had to be absorbed by the official institution, with its own production and with direct importation. In this way, competition has been eliminated, prices have been fixed and the outlet of all national production has been insured.[13]

After a period of dissension, an agreement between the Government and the private companies, signed on June 28, 1937, designated the manner in which the Argentine market was to be apportioned among the various companies.[14] The Y.P.F's share of the market was to be increased to take care of the whole future increase in consumption up to a specified amount. Increases above that amount, up to a certain maximum, were allotted to producers using domestic sources of supply. Any further increase was to be shared on a

---

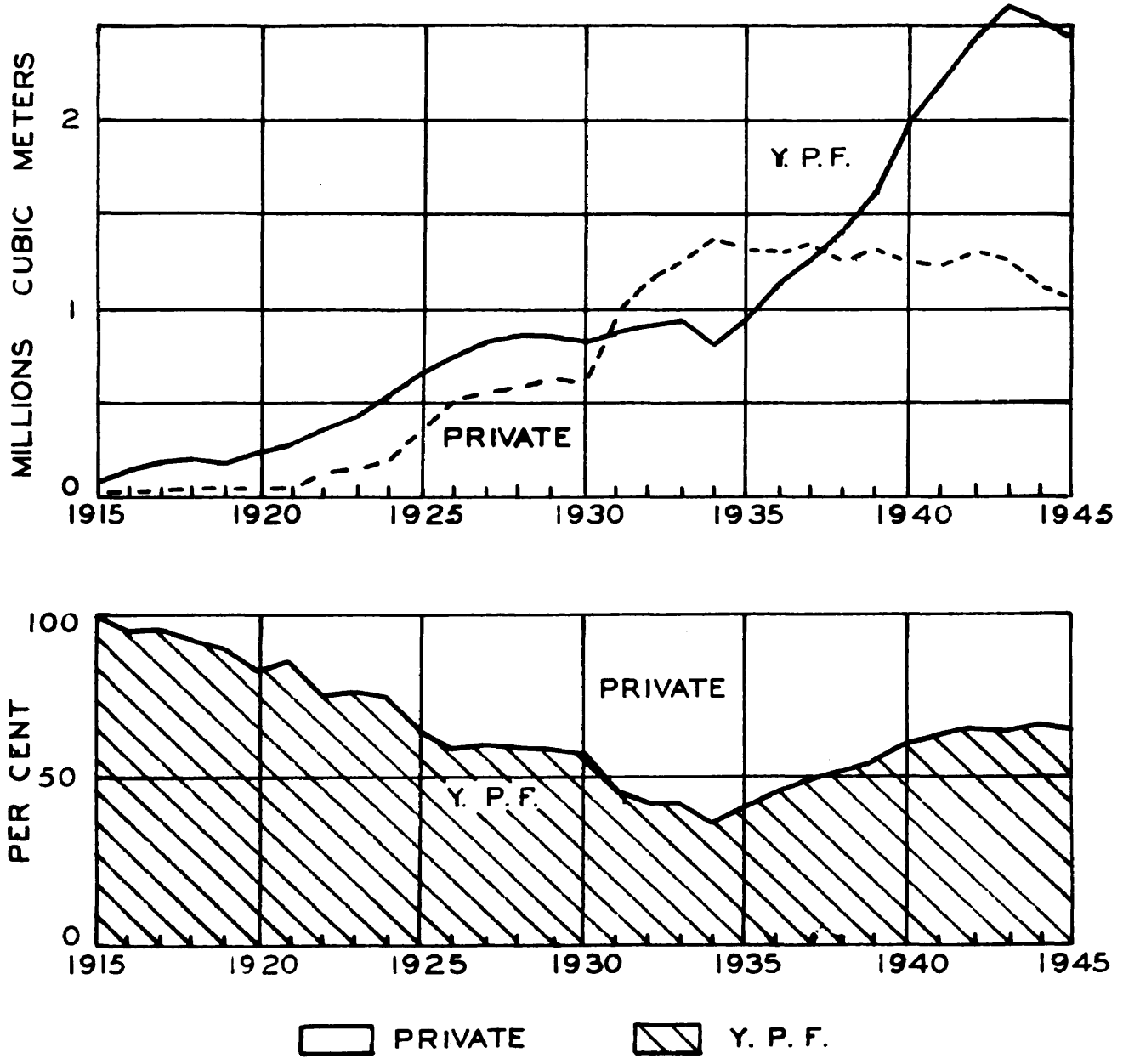
[12] U.S. Bur. of Foreign and Domestic Commerce, Trade Inf. Bull. No. 520, op. cit.

[13] Anuario Geográfico Argentino 1941, op. cit., p. 299.

[14] U.S. Tariff Commission. Economic Controls and Commercial Policy, op. cit., p. 26.

FIGURE 11

ARGENTINE PRODUCTION OF CRUDE PETROLEUM



ESTADÍSTICA DE PETRÓLEO DE LA REPÚBLICA ARGENTINA, 1943, OP. CIT., P. 12 AND REVIEW OF THE RIVER PLATE (SEPTEMBER 13, 1946) PP. 3–4.

specified basis between the Y.P.F. and the domestic companies. If it became necessary to increase imports, all companies were to share in proportion to their domestic quotas. Thus, the activities of private companies has been restricted.

Undoubtedly, the national consumption could have been met with national production if the activities, especially exploratory measures, had not been so severely restricted. The Y.P.F., henceforth, extended all their activities.[15] The figures of the petroleum production of the State oilfields for 1943 showed an increase of 7.7 per cent over 1942, and this despite the shortage of machinery. In fact, 97 new wells were completed in 1943 in the various oilfields, 46 exploratory drillings were made, and 13 more were in progress at the end of the year.[16] The greatest annual production of petroleum and the largest profits ever made were reported by the Y.P.F. for the year 1943.[17] There was a considerable increase in production in the Plaza Huincul field, and a smaller increase in the Comodoro Rivadavia field, though there was a slight falling off in Mendoza and Salta fields.[18]

Recently, a new oil pool was discovered 16 miles from Caleta Olivia on the San Jorge Gulf, 90 kilometers south-southwest of Comodoro Rivadavia (Fig. 10).[19]

---

[15] In February 1941 an agreement was signed between the Y.P.F. Argentina and the Y.P.F. Bolivianos, the corresponding Bolivian entity, to link Southern Bolivia with Northern Argentina across the Río Bermejo. The flow of oil over the pipeline began September 2, 1942. They took over a special pipeline of the Standard Oil Company running from Agua Blanca to the State Railway station at Manuel Elordi in the Province of Salta, and then linked Bermejo to that pipe line at Agua Blanca. "Some Argentine Petroleum Developments in 1942," Bulletin of Pan American Union, 77 (August, 1943), 466-7.

[16] Review of the River Plate, XCVII, No. 2754 (September 22, 1944), 9.

[17] Rev. of the River Plate, XCVII, No. 2755 (September 29, 1944), 18.

[18] Ibid.

[19] "Importancia del Descubrimiento Petrolífero de Caleta Olivia." Boletín de la Secretaría de Industria y Comercio, Núm. III, año I (Diciembre de 1944), 262.

The national production of petroleum for 1943 was attained largely through the reconditioning of used equipment and the substitution of locally manufactured equipment for that normally imported.

While absolute figures for petroleum production showed an increase each year until 1943, when the maximum production was attained, that maximum was reached at a declining rate of increase. After 1943 a recession set in that gained momentum.[20]

According to the Secretariat of Industry and Commerce statistics of petroleum output in Argentina for the first 6 months of 1946 showed a substantial decline for the Y.P.F., as well as for those of private companies, due to the shortage of capital equipment. The total production of petroleum for the first 6 months of 1946 was only 1.644.000 cubic meters, while that for the same period in 1945 was 1.839.000 cubic meters.[21]

How much time will elapse before oil production regains and surpasses the peak of a few years ago will be determined largely by the rapidity with which new machines and new techniques can be introduced.

In 1941 the difference between the national production and the national consumption of crude petroleum, or a deficit of 14 per cent, was met with imports, amounting to 72.024.000 pesos (tariff value), coming largely from Peru, Venezuela, Colombia, and the United States.[22]

Crude petroleum was, by far, the most important of the lubricants imported in that year. In fact, the trend over a period of years has been for an increased importation of fuel oil, diesel oil, gas oil, and crude

---

[20] Rev. of the River Plate, CI, No. 2657 (September 13, 1946), 3-4.

[21] Ibid.

[22] Anuario del Comercio Exterior de la República Argentina, 1941, op. cit., pp. 252-3.

petroleum, and a decreased inflow of gasoline, kerosene, mineral oil, greases and other derivatives. This is suggestive of the fact that the refineries in Argentina have increasingly produced the latter products.

Referring to the ad valorem duties on imports of petroleum one discovers that all crude petroleum was dutiable. Fuel oil and diesel oil were subject to 5 per cent duty, gas oil to 12 per cent duty, while kerosene came in duty-free in 1941.[23]

The La Plata refinery in the Province of Buenos Aires (Fig. 10) was the largest of the 19 refineries in the country. It had a daily capacity of 31.430 barrels. It was the first in the country to use modern methods such as are used in the United States. It began production of gasoline, kerosene and fuel oil in 1926 and two years later obtained also tractor oil and Diesel fuel-oil. By 1933 it was producing "supergas Y.P.F."

That the quantity of petroleum available for consumption in 1941, both from domestic and foreign sources, fell short of meeting the national needs for fuel was due largely to several factors. First, the disturbed world conditions precluded the shipment of fuels, especially coal and fuel oil to Argentina. Second, the National Government, through a series of Decrees, showed its desire to exploit liquid fuels and solid mineral fuels in the country. And third, because of shipping shortages, large quantities of grain were accumulating, and along with various other residues, were drawn upon to help fulfill the demand of the fuel and power consumers in the Nation.

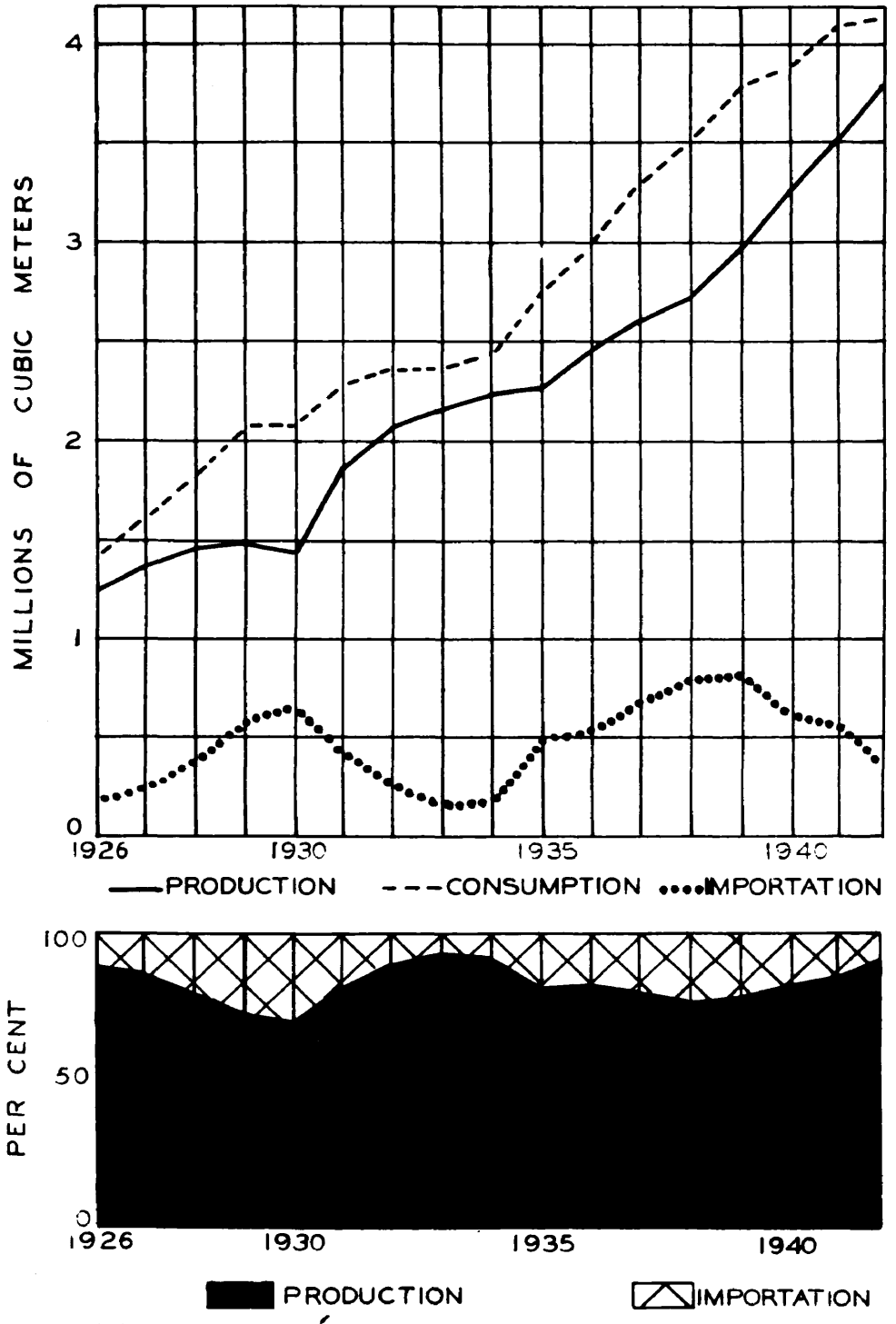
Moreover, the fact that the national production of petroleum has never been able to meet the national consumption of petroleum (Fig. 12) may, in all probability, be due to the restrictions placed on the activities of the private companies.

---

[23] Ibid., p. 352.

FIGURE 12

ARGENTINE CONSUMPTION OF CRUDE PETROLEUM



ANUARIO GEOGRÁFICO. ARGENTINO, 1941, OP. CIT., P. 301 AND SUPLEMENTO, 1942, OP. CIT., P. 122

Wood consumption.-It will be remembered that the consumption of wood for fuel was greatly accelerated after 1940 in response to the decline in fuel importation and the interest of the Government in furthering the use by consumers of domestic fuels. This has been one of the most wasteful aspects of the fuel economy in Argentina due not only to the primitive and wasteful methods of producing the forest products, but also to the lack of a program of reforestation on any mentionable scale.

Approximately 30 per cent of the surface area of the Nation is said to be forested. This statement is of little significance for it fails to include any hint as to the quality or quantity of wood available. Table XXI gives a little better idea of the portion of each province and territory covered with forests, but these data are old, and with the increased rate of wood consumption during the last few years, they certainly bear little weight today.

The forest areas vary widely as to distribution and species. The Northern forests constitute the southern extremities of the broad forest belt which extends southward through the Continent of South America. These forests were the ones drawn upon to supply the additional tonnage of firewood and charcoal in demand during recent years. They extend rather generally throughout the Territories of Formosa and Chaco, and the Provinces of Santiago del Estero and Santa Fé. The whole area is frequently referred to as El Gran Chaco meaning the Great Forest. Numerous species are to be found, such as, the white quebracho (el quebracho blanco) mostly used for charcoal; the red quebracho (el quebracho colorado santiagueño) on which the world-renowned quebracho extract industry is based, lower grades of which are cut for railroad ties and firewood; the algarrobo used principally for fuel; some varieties of palms, and many other species of trees too numerous to mention.

TABLE XXI

ESTIMATED FOREST AREA OF ARGENTINA, 1915*
By Province and Territory

Rank	Province or Territory	Per cent Forested	% of Total Argentine Forests
1.	Tucumán	88.0	1.9
2.	Misiones	87.1	2.4
3.	La Rioja	86.3	7.3
4.	Córdoba	84.5	12.8
5.	Santiago del Estero	83.5	10.0
6.	Salta	83.0	10.0
7.	Chaco	82.5	7.7
8.	San Luis	79.3	5.6
9.	Catamarca	73.2	4.8
10.	San Juan	72.2	5.8
11.	Entre Ríos	66.3	4.6
12.	Corrientes	54.3	4.4
13.	Formosa	54.1	3.8
14.	Mendoza	51.6	7.3
15.	Santa Fé	45.1	5.5
16.	Tierra del Fuego	41.6	0.8
17.	Jujuy	39.2	1.8
18.	La Pampa	13.4	1.8
19.	Chubut	4.5	0.9
20.	Neuquén	3.2	0.3
21.	Santa Cruz	0.8	0.2
22.	Río Negro	0.7	0.1
23.	Buenos Aires	0.6	0.2

*Armour Research Foundation, op. cit., p. 285.

White quebracho is a fine-grained hardwood used for firewood and charcoal and to a lesser extent for shoe lasts. The red quebracho, by far the most economically exploited species, is cut for extraction of tannin only when the percentage content of procurable extract is high. The species of white quebracho of lower grade is cut for firewood, and especially is this true in the Province of Santiago del Estero.

The algarrobo is used chiefly for fuel. It grows rapidly in various types of soil, quite in contrast to the red quebracho which grows very slowly.

The waste of a practically non-renewable natural resource, forests being a long-time crop, has been pointed out by various individuals, and especially by the Armour Research Foundation, which included the forest industries in their technological and industrial survey of the country. According to them, whole sections of woodland were cut and shipped to the cities for firewood, including valuable hardwoods and those containing commercially extractive substances. Figure 13 shows the increased consumption of charcoal over the 20-year period from 1922 to 1941.

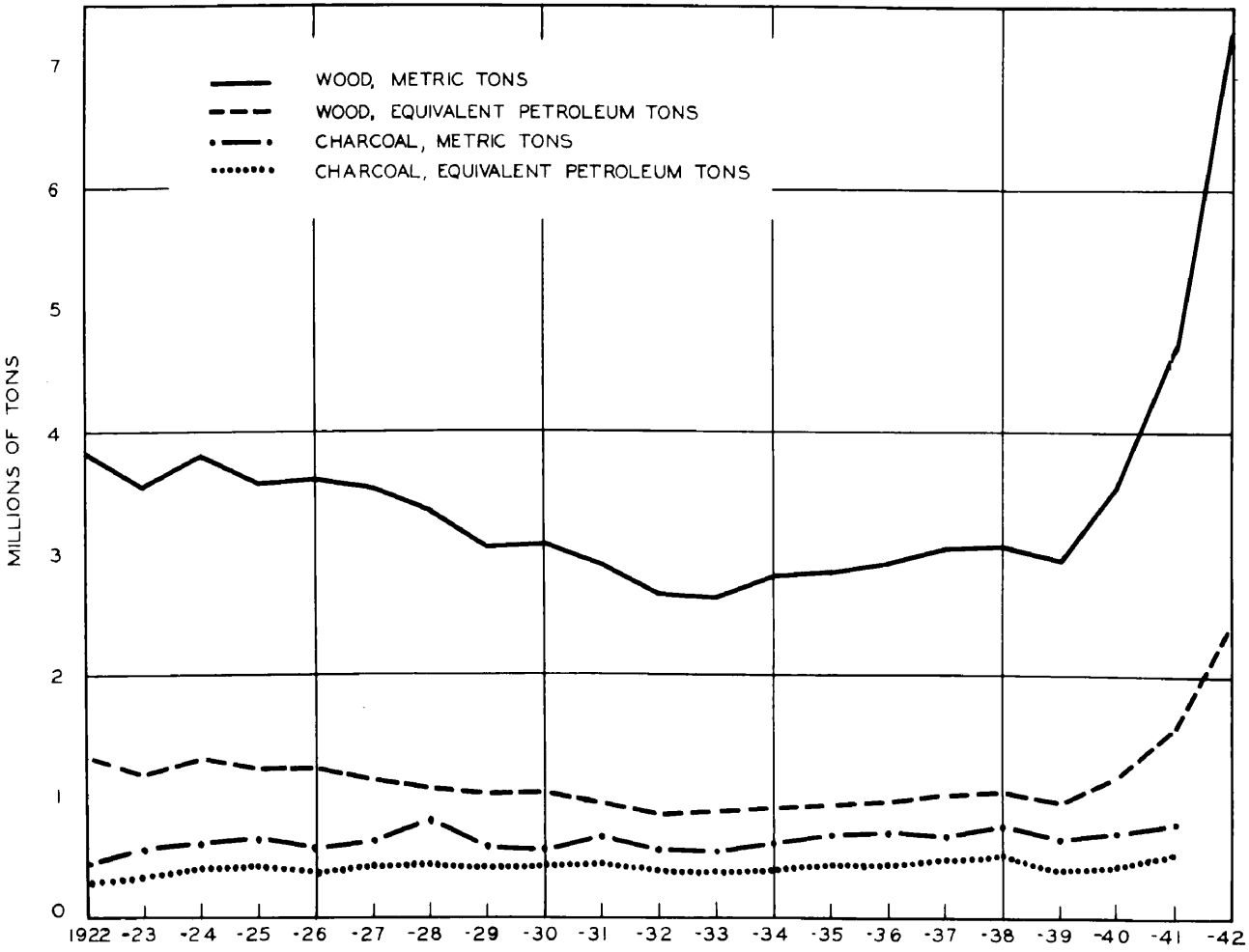
The making of charcoal is especially wasteful. Almost all is produced by primitive slow-burning of piles of wood under mounds of earth or mud bricks, and thus the soluble tar, pitch, creosote oil, fuel gas, and other by-products are lost. The making of charcoal is in the hands of a large number of small operators. The operator selects a section of woodland containing a large stand of al quebracho blanco, and leases the land or buys the timber from the owner. The men he hires to do the work are paid on the basis of the charcoal produced. The earth-covered charcoal mound is made where the wood is cut.[24]

---

[24] Armour Research Foundation, op. cit., pp. 291-3.

FIGURE 13

CONSUMPTION OF WOOD AND CHARCOAL IN ARGENTINA



INSTITUTO DE ESTUDIOS ECONÓMICOS DEL TRANSPORTE, OP. CIT., P. 7

There was a plant at Quilino, Córdoba, which consisted of 14 permanent oval-shaped ovens of adobe brick. Each oven was charged with 45 to 50 tons of wood. An igniting train of charcoal was laid from the door to the center of the oven, then the door was bricked shut. After 9 or 10 days burning, 12 to 13 tons of charcoal were ready to be shipped to Córdoba and Buenos Aires.[25]

In general, charcoal was consumed in the cities with only about 11 per cent consumed at the point of production. Several new industrial applications were found for this type of fuel during the last war. Steel makers used it as a substitute for coke (charcoal from el quebracho blanco can be made to perform in furnaces), and there was a small export trade in charcoal.

In converting hardwood into a dozen or more needed products there is much waste. It was estimated that in 1941 Argentina's charcoal industry threw away 30.000.000 liters of methanol, almost the same amount of creosote oil, ten times that much soluble tar, and more than 75.000.000 kilos of pure acetic acid, not to mention other solvents, pitch and gas which should have been recovered.[26]

The location of the areas in the country that produced charcoal are shown on Figure 10.

Figure 13 also presents the total consumption of wood as fuel in Argentina in metric tons and in equivalent petroleum tons, from 1922 to 1942, inclusive. One can see that the trend in consumption was downward from around 1932 to 1939, then an upward swing in consumption took place, that of 1942 being almost twice that of 1941. It may be readily inferred

---

[25] Armour Research Foundation, op. cit., p. 293.

[26] Ibid., p. 316.

that the consumption of wood for fuel is very wasteful inasmuch as 7.000.000 metric tons equalled only about 2.500.000 equivalent petroleum tons in 1942.

The consumption of wood and charcoal increased from 4.066.000 to 8.517.749 tons in only three years, and probably was 10.000.000 tons in 1944. This has presented many problems, especially for the railroads.... justifiable only in an emergency.[27]

What the National Government proposed to do about the increased utilization of wood as fuel can be learned from the Decree passed in April 1946. The following statements are quoted from the introductory paragraphs of that Decree:

Considering:

> That the return of normal imports of fuel-oil will bring about a considerable decrease in the consumption of firewood, and that the State cannot be indifferent to the position in which the wood-cutting industry is thus placed;
>
> That this does not imply that the high level of production should be maintained, but that the industry should be protected so that its return to the former level of output should be gradual;
>
> That the transport of wood by river should be encouraged, to relieve pressure on the railways, and that it is preferable that it should be neither burned nor transported in its natural state, but transformed into products with a higher calorific value (charcoal, briquettes, etc.);
>
> That measures to promote afforestation and reafforestation should be enforced;[28]

Railroads under National jurisdiction during 1946 were expected to consume 2.000.000 tons of wood fuels unless they substituted Argentine coal. Other railroads and electric power plants and industrial establishments were expected to use 50 per cent of the volume of wood fuels

---

[27]Brunenge, op. cit., p. 15.

[28]Rev. of the River Plate, C. No. 2839 (May 10, 1946), p. 44.

consumed in 1945.

Solid mineral fuels.--International circumstances have determined largely the extent to which the solid mineral fuels have been explored and exploited in Argentina. The deposits are generally of low quality and remotely situated from the consuming centers, hence the high costs of production have tended to inhibit their development except in times of extreme need. Concurrently, external conditions are making it necessary for the Nation to extend mining activities further in order to meet the deficiency left by the diminution of British coal exports to Argentina.

Coal deposits of varying qualities, ranging from peat to subbituminous, are known to exist all along the eastern flanks of the Andean Cordilleras, from Jujuy to Tierra del Fuego (Fig. 10). The coal beds belong to the more recent geological periods, the Tertiary and the Triassic. They are friable in nature, have ash contents up to as much as 50 per cent, and are of low calorific value since they were formed largely from trees of fern variety which lacked the consistency of coals formed from harder trees.[29] All the known fields are located in geographic situations that are difficult to exploit economically. Only small workings of the most accessible deposits have ever occurred. Recent economic pressure on the fuel supply accelerated considerably coal mining operations, especially in the Province of Mendoza and in the Territory of Neuquén from 1941 to 1942, and in the Province of San Juan from 1942 to 1943. The Province of La Rioja and the Territory of Santa Cruz began to produce coal in 1943.

According to the Dirección de Minas y Geología the production of solid

---

[29]"Fuels and Sources of Power," Rev. of the River Plate, XCVII, No. 2763 (November 24, 1944), p. 12.

fuels in 1941 was 17.216 tons (16.646 tons of asphaltite[30] and 570 tons of coal) valued at 910.000 pesos. The volume of production for 1941 showed an increase of more than 50 per cent over that of 1940. From 1941 to 1942, the Nation's total production just about quadrupled, amounting to 61.232 tons, valued at 3.740.000 pesos. Between 1942 and 1943 the production doubled, reaching a high of 113.140 tons, valued at 7.685.000 pesos (Table XXII).

The Province of Mendoza furnished about 60 per cent of the solid fuels produced in 1941, and has continued to hold first place in the production in the country. The Territory of Neuquén has held second place, with the Territory of Río Negro maintaining third place. By 1942 the Province of San Juan contributed 245 tons of coal, and by 1943 the Province of La Rioja and the Territory of Santa Cruz were also producing small tonnages (619 and 995 tons, respectively) of solid fuels.

The greatest possibilities for potential exploitation of coal seem to be in that part of the country extending along the mountain ranges of Southern Neuquén, western Río Negro, and Northern Chubut, from the 40th degree to the 43rd degree parallels of South latitude. That region seems to be the most promising one from the point of view of the beds already in production, considering the quality and the ease of getting the mined coal across country by way of railroad transportation to the consuming nuclei around the Federal Capital and in Greater Buenos Aires.[31]

Mendoza-Neuquén fields.[32]—The Province of Mendoza produced almost

---

[30]Asphaltite is not coal, but solidified petroleum. These deposits found in Mendoza and Neuquén have a valuable content of vanadium, indispensable in certain branches of metallurgy. By a process of cracking by which their most valuable ingredients are separated, they leave a coke which is a first-class fuel.

[31]Anuario Geográfico Argentino. 1941. op. cit., p. 297.

[32]República Argentina. Ministerio de Agricultura de la Nación. Dirección de Minas y Geología, Estadística Minera de la Nación. 1941. Publ. No. 126 (Buenos Aires 1942), pp. 68-70.

TABLE XXII

PRODUCTION OF SOLID FUELS IN ARGENTINA
For the Years 1941 to 1943*

Province or Territory	1941		1942		1943	
	Tons	T. Pesos	Tons	T. Pesos	Tons	T. Pesos
Mendoza	10.289	(1)	32.278	2.004	77.462	5.416
Neuquén	6.357	(1)	24.109	1.496	28.646	1.988
Río Negro	450	(1)	4.600	225	4.668	186
Santa Cruz	..	(1)	..	..	995	40
San Juan	..	(1)	245	12	750	30
La Rioja	..	(1)	..	..	619	25
Chubut	120	(1)	..	..	..	..
Total	17.216	910	61.232	3.740	113.140	7.685
Type of Fuel						
Asphaltite	16.646	883	56.387	3.500	105.625	7.385
Coal	570	27	4.845	240	7.515	300
Total	17.216	910	61.232	3.740	113.140	7.685

*Estadística Minera de la Nación, 1943, op. cit., p. 69.

Note: (1) no data available.

two-thirds of the national production of solid fuels in 1941. The mines lie in the southern part of the province (Fig. 10). The mine "La Valenciana" situated in the district of Malargüe, department of San Rafael, produced all the coal registered for the province. It is asphaltite, with a calorific value between 6.000 and 7.500 cal/kg, with little sulphur, and almost free from ash. Formerly, almost all the asphaltite mined was transported by trucks to the station of embarcation at Pedro Vargas (250 kilometers from the mine). Recently, however, a branch railroad was constructed by the State to connect Malargüe to Pedros Vargas, through El Sosneado.

In the course of the year a beginning at opening up an asphaltite mine "San Martín" was initiated, situated also in the department of San Rafael, 292 kilometers from Pedro Vargas.

Northern Neuquén also lies in the asphaltite field. The exploitation of the beds was only partially carried out during 1941 owing to the work entailed in getting the mines ready for larger operations.

The "Auca-Mahuida" mine was the largest producer.[33] It is situated in the sierra of the same name, in whose zone also are exploited pure asphaltites, of high calorific value and of low impurity content. The product is transported by trucks to the station Contralmirante Cordero, 130 kilometers from the mine.

The mine "Santa Marta," is located in the zone of Taquimilán, department of Ñorquín, 20 kilometers to the south of Chos Malal and 150 kilometers north from Zapala, its station of embarcation. Until 1941, it had been the principal producer of solid fuels, but was not operating the

---

[33]There was a monthly extraction of about 1.000 tons of asphaltite during 1945. Romeo Croce, "Minerales Argentinos Para La Industria de Guerra." Revista Geográfica Americana, Año XI - Vol. XXII, Núm. 132 (Septiembre 1944), 145.

greater part of 1941 because new equipment was being installed, in order to increase future production. Asphaltite seams of high volatile content are in existence. The mine is a narrow drift seam of approximately 1 meter in thickness, shaft-worked using steam-driven elevators. In 1940 the mine employed 350 men. The coal was transported over a dirt road by means of small and large trucks. As an example of one of the causes of the high cost of coal production in Argentina, it is appropriate to cite the conditions found by the Armour Research Foundation field party at that mine. Here is what they found:

> No mechanical loading equipment is used. At Zapala the trucks are backed up to the 30ton low railroad cars so that their tailgates may actually overhang the car, but instead of dumping the entire truckload in a few seconds, the coal is slowly and laboriously shovelled by hand from truck to railroad car.[34]

Moreover, the long haul to Buenos Aires, plus the exposure of the coal to rain and to theft results in high costs.[35] The coal from this mine was sold for 50 pesos a ton and was mixed with imported coal.[36] The coal itself is suited to by-product uses, that is, it is capable of producing fuel gas, tars, oils, and a type of coke.

During the year of 1941, preliminary work on the mine "La Riquesa," began. It is situated in the zone of La Yesera, department of Pehuenches, 320 kilometers from Contralmirante Cordero on the Río Negro.

The fundamental circumstance that has impeded a greater development of all these producing centers is the great distance from the railroad station.

Río Negro-Chubut fields.-[37]The group of beds in Río Negro, situated

---

[34]Armour Research Foundation, op. cit., p. 316.

[35]Rev. of the River Plate, op. cit.

[36]Ibid.

[37]Estadística Minera de la Nación, 1941, op. cit.

about 80 kilometers north of Norquinco in the department of Norquinco. "Quimey Mamil," "Arroyo Montoso" and "Morro Revancha" were earlier producers of coal. Greater production is expected in the future. These beds lie near the railroad (from Jacobacci to Esquel, Chubut), and are the few favored by that situation. Most of it was loaded at the station of Ñirihuau.

Near Lake Epuyén in the cordillera of the Territory of Chubut are large reserves, probably 10.000.000 tons, of Tertiary veins of coal of sub-bituminous quality. The mine "General José de San Martín" situated 8 kilometers from Epuyén, and 30 kilometers east of the railroad has been the large producer in that area, but its production began to decrease. All the other mines in the environs of Esquel produce coal for local consumption. Two tons of this coal, which has to be washed, are said to equal 1 ton of imported coal. Four or 5 tons of the coal would have to be mined and washed, and 2 tons of washed product transported, thus effective competition with 1 ton of imported coal seems out of the question.[38]

In Southern Neuquén and Northern Chubut there are also lignite beds of the Tertiary age which are mined for local use. These veins are interstratified also with shale beds up to 3 feet wide. The ash content is from 15 to 25 per cent, while the calorific value is from 2.000 to 5.000.

Santa Cruz fields.--[39]Another coal zone lies in the Andean regions in Southern Santa Cruz, but known areas of rock likely to contain coal are not extensive. The population of that region is very sparse, thus there is a small demand for fuel in that region, and on the other hand, wood is available as well as potential water power.

---

[38]Bain, op. cit., p. 180.

[39]Estadística Minera de la Nación, 1941, op. cit.

La Rioja-San Juan - Northern Mendoza fields.-[40] Near the railway station of Marayes, Province of San Juan, there are Triassic seams 2 to 6 inches in thickness, interstratified in shale beds over a width of about 10 feet which go to a depth of approximately 300 feet. The beds are not much faulted and the coal is of regular thickness. The coal has a calorific value from 5.000 to 6.000, an ash content of from 20 to 50 per cent, and sulphur content ranging from 3 to 7 per cent. The coal could be of some value in times of economic need. By 1943, coal in the department of Iglesia, district of Rumco, 50 kilometers from Jacal was produced.

In the environs of Villa Unión, Province of La Rioja, beds of bituminous schists were exploited in 1943 (department of Lavalle). Its point of embarcation was Monogasta, about 90 kilometers east of Villa Unión.

Other solid fuels.-Beds of peat cover some 500 kilometers with an average thickness of some 6 meters in the Northern part of Tierra del Fuego (Fig. 10). When dried the peat has a value of some 3.000 to 4.000 calories. The reserves are estimated to be around 60.000.000 tons. Peat bogs are said to occur in Northern Argentina in the Province of Jujuy.

There are also small scattered outcrops of coal in the Provinces of Jujuy, Salta and Catamarca, and in the Territories of Santa Cruz and Tierra del Fuego.

The year 1941 saw the end of agitation and disorganization in the exploitation of the fuels as a result of world conditions, and there began the mining of solid fuels based on economic mining criteria. The improvement of the mines, the systematic exploration and exploitation of the mines, and the improvement of roads were initiated. In general the fuels extracted were of fairly good quality, in respect to the calorific

---

[40] Estadística Minera de la Nación, op. cit., and Foreign Minerals Quarterly, op. cit.

value, appreciably high in the asphaltites, and a low content of sulphur and moisture.

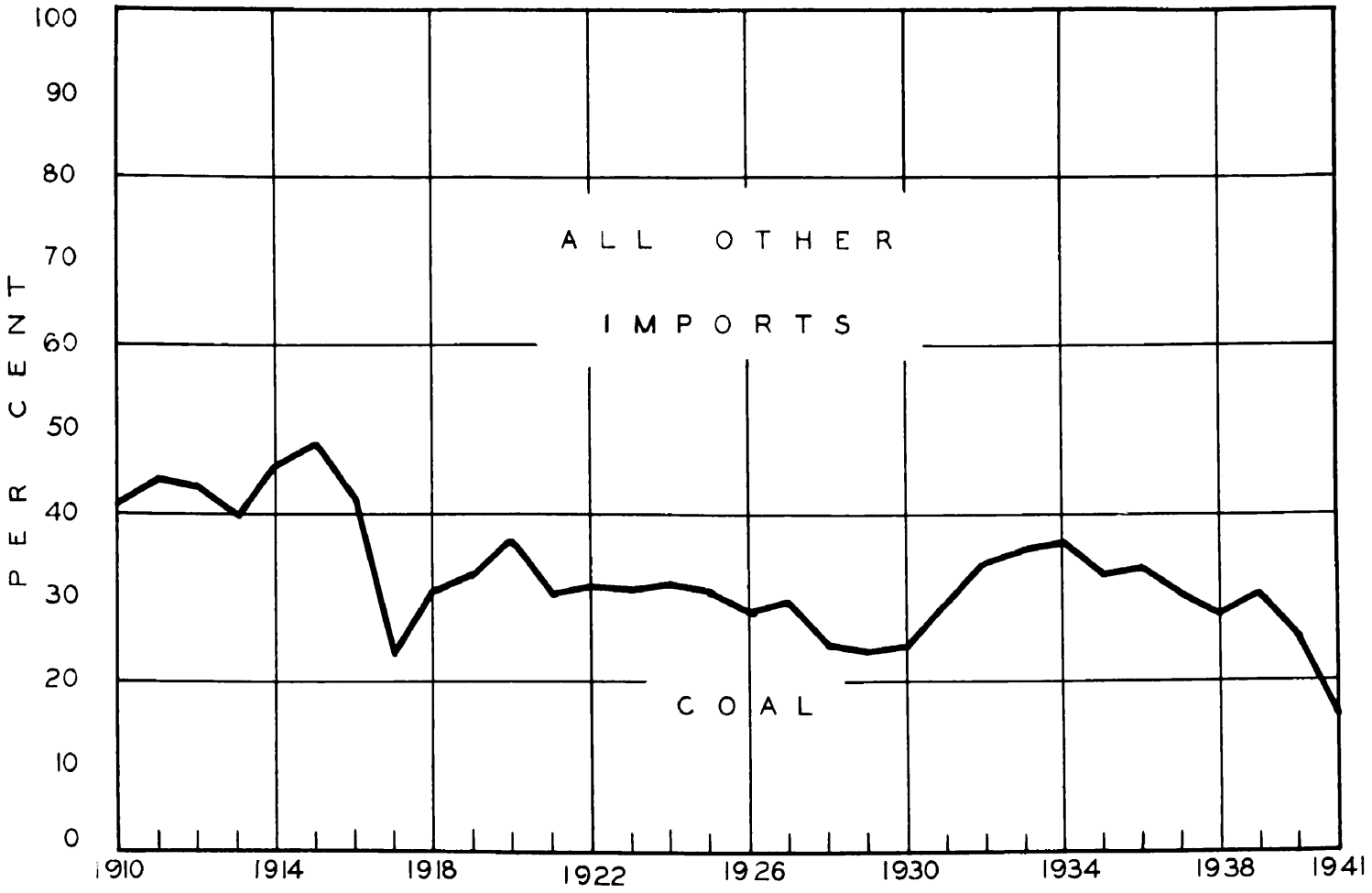
The State showed added interest, and a series of measures were enacted intensifying the exploitation of the beds in the country. The Decree of October 15, 1941, authorized the Bank of the Argentine Nation to extend credit, for opening up of new deposits and for the intensification of those that were in exploitation. By the same Decree, the minerals were reserved for the official exploration and exploitation by the State, and by the end of 2 years, all the Territory of Neuquén, and part of Chubut and Río Negro, between 69 degree West longitude and the Chilean boundary was included.

Coal imports.-Coal has been one of the largest items of import into Argentina having amounted to 44.7 per cent of all imports, by tonnage, in 1911. The percentage of coal imports to the total imports declined, and for the next three decennial periods amounted to 30.1, 29.6, and 15.5 per cent, respectively (Fig. 14). Several reasons account in part for this decrease in the proportion of coal imports to the total imports. In the first place, efficiency of fuel conversion, especially in the case of coal, has enormously increased over the past quarter century; secondly, coal has tended to decline in importance relative to petroleum fuels ever since oil was discovered in the country after the turn of the century; thirdly, crude petroleum and fuel oil have been gradually supplanting coal in the import trade because they are much easier and cheaper to handle than is coal; and lastly, the reallocation of British shipping during the last war resulted in a marked curtailment of the Nation's chief source of coal.

The tonnage of coal imports has remained substantially high, however, amounting to approximately 3.000.000 tons from 1937 to 1939, dropping to

FIGURE 14

ARGENTINE COAL IMPORTS



ANUARIO DEL COMERCIO EXTERIOR DE LA REPÚBLICA ARGENTINA, 1941. OP. CIT., P.19

around 2.000.000 tons in 1940, and to about 1.000.000 tons in 1941. By 1943 the coal imports dropped to 575.621 tons, and were only 290.680 tons during January-June of 1944.[41]

The total consumption of coal in 1941 was 1.387.000 metric tons (991.000 expressed as equivalent tons of petroleum). Of that total, 1.387.000 metric tons (977.000 petroleum tons) were imported, or 98.6 per cent while the mines in the country only supplied 1.4 per cent of the coal consumed in that year, or 20.000 metric tons (14.000 petroleum tons).[42]

A brief review of the coal trade of Argentina from 1913 to 1939 reveals interesting aspects of the minor shifts in origin of coal, its gradual displacement by oil as a fuel, and the difficulties posed by external economic conditions as reflected in the comparative prices of coal and oil.[43]

During World War I and throughout 1919 the railroads in Argentina experienced difficulties as a result of the decrease in coal imports and had to resort to burning hard wood and petroleum. In regions where no coal was mined the situation was most grave. Between 1913 and 1919 coal consumption was replaced almost entirely by wood and oil consumption.

By 1923 the imports of coal rose to approximately 50 per cent of those of the 1913 level, the increased imports being due to the lower prices which had influenced the consumers of fuel oil to use coal. Small

---

[41] According to law No. 11.538 the importation of solid fuels does not require any customs duty. Estadística Minera de la Nación, 1941, op. cit., p. 56, and Anuario del Comercio Exterior de la República Argentina 1941, op. cit., p. 352.

[42] Instituto de Estudios Economicos del Transporte, op. cit. p. 21.

[43] Gt. Brit. Dep't. of Overseas Trade, op. cit., Rpts. 1919-1939, inclusive.

amounts of North American and South African coal, and a load of German coal, were delivered. The principal receiver of American coal was the meat freezing works at La Plata.

Imports in 1924 again rose, all but an insignificant amount of which was supplied by the United Kingdom. The loss of not only 750.000 tons of coal annually less imported, but also of additional fuel requirements compared with 1913 was due, not to competition from other sources, but to the displacement of coal by oil. Most of the coal was British, with German and American coming next.

By 1927, the importation of Australian, South African, Brazilian, Chilean, and Canadian coal had entirely ceased. Fairly large amounts of German washed nut coal were imported after World War I by the electric light companies. A number of local industries formerly using coal for fuel, used petroleum in that year, but the price of petroleum compared disadvantageously with coal, so the situation again altered itself. The bulk of coal consumed in Argentina was of British origin, because it was of higher quality and there were more favorable freight conditions ruling between the United Kingdom and South American ports as compared with those from the United States.

The light and power companies in Buenos Aires imported more of their requirements of coal from Germany than from the United Kingdom in 1926. The great competitor of British coal was imported and Argentine oil, both for land and for bunkering usage. The price factor, dependent on outward freight rates plus loaded cost, was in favor of coal.

The steady production of petroleum in the Comodoro Rivadavia region had no appreciable influence on coal consumption up to 1930. Bunkering fell off because most of the large liners had become equipped with diesel engines, and thus, the need for Welsh coals, hard-steam coals suited for

bunkering purposes, declined. In forge coal, foundry coke and house coal, British coal was preferred. In the year 1929, coal originated in Britain, Germany, United States and Russia.

Conditions in the coal trade during 1930 were difficult, on account of the exchange situation and the high outward freight demanded. Higher prices locally made competition with domestic oil more difficult. There was a further decrease in bunkering coal, and an increase in the importation of sized coals for electric power plants and in British foundry cokes. German smithy coals and steam briquettes were imported in increasing quantities.

The United Kingdom's share of the imports of coal was about 75 per cent during the years from 1936 to 1939, in contrast with 69.2 per cent registered in 1932. British railways accounted for more than half of the total imports from the United Kingdom. That Britain has supplied Argentina with the largest tonnage of coal over a period of years is due to several factors.[44] British coal was of high grade, consequently the freight cost on a unit of heat was less. British producers have pushed their coal harder on foreign markets than have other nations. Much of the industry in Argentina has been financed with British money and was under the technical supervision of the British. Thus, the industries have been provided with equipment designed for burning British coal, and the natural tendency has been to burn British coal. The coal purchases were made through a London Office, where the force of pressure to "buy British" coal could not easily be overcome. Large amounts of shipping have plied between Great Britain and Argentina, and thus made for competitive conditions in carrying rates and ensured a steady supply throughout

---

[44] Bain, op. cit., p. 176.

the year without maintaining stocks in Argentina to provide for irregularities in arrivals.

In 1938, the coal imports were furnished by the United Kingdom, Germany, Poland and the Netherlands. A small amount of Turkish coal appeared on the market, but did not find a ready sale. High-quality coke came from the United Kingdom, and cheap and inferior quality coke for foundry work came in from Germany.

The situation in 1941 has already been described as to the nature of the origin of coal, in earlier pages of this chapter.

Concerning the export of British coal to Argentina today, two opinions seem to prevail in Britain. One is that the British Government does not want to lose so advantageous a market as Argentina, and the other, that the export of unprocessed coal has served no useful national purpose.

The British Institute of Export mirrors the latter view. According to Wakefield Adam, who carried out research:

> It has been proved that the most wasteful method of using coal is to burn it.....Primary and ancilliary requirements of many thousands of industries, are irretrievably lost to the nation by the consumption of 'raw' coal.....
>
> Prices obtained abroad have not been large, and the necessity of keeping a careful watch upon cost of production has necessarily had an adverse effect upon wage conditions in the industry. It is possible that if markets can be obtained for derivatives, a better contribution to the national economy might be made by their export. It is surely utterly wrong, whether viewed from an angle of national interest or from one of pure common sense, that millions of tons of coal should be sold abroad at low prices....where they are processed so that their coke and gas may be employed for local power and their invaluable derivatives applied to the development of local industries while the British coal miner receives poor wages.[45]

Today the British coal mining industry is a sick industry. According to Arthur Horner, Secretary of the National Union of Mineworkers,

---

[45] "Britain's Coal Exports to Argentina," Rev. of the River Plate XCVII, No. 2758 (October 20, 1944), 44-45.

"without a solution of the coal problem the whole structure of the British economy must fall." He stated further in his address, in Birmingham, September 21, 1946, "....for Britain to meet her essential needs about 4.000.000 tons of coal a week for 50 weeks in the year are needed." He added further, "The figures for August show that the output declined during the month to an average of 2.893.000 tons a week."[46]

At another meeting in Cardiff, South Wales, on that same day, Baron Eyndley, Chairman of the Coal Board which was to run the nationalized coal industry, said that British coal exports had now almost ended. "It is no good talking about exports today....because we have hardly enough coal to keep the wheels going at home."[47]

Unfortunately, only smatterings of descriptive data are on hand relating to the cost of imported coal in Buenos Aires. It has been mentioned that an increase in the price of coal or a lowering of the price of fuel oil encouraged substitution of fuel oil for coal, and vice versa. This, we know, has occurred in Argentina just as it has taken place elsewhere. We also know that Argentina has imported coal over a period of years because it was cheaper to do so than to prospect and open up domestic mines.

The consumption of fuel by the railroads shows the extent to which the price of fuel has risen from 1938 to 1943.[48] The average cost per ton of fuels consumed by the National Railroads[49] showed considerable

---

[46]"Bankrupt Britain Feared Over Coal," New York Times (September 21, 1946).

[47]New York Times, op. cit.

[48]See Appendix Table 11.

[49]Instituto de Estudios Economicos del Transporte. Consumo Ferroviario de Combustibles en 1942 y 1943 (Buenos Aires 14 de Septiembre de 1944), p. 11.

increase from 1942 to 1943. For example, the average cost per ton of petroleum in 1942 was 48.14 pesos and in 1943 was 86.76 pesos. The price of coal rose from 50.61 to 74.01 pesos per ton, oil cake from 28.80 to 53.91 pesos per ton, maize from 8.37 to 27.82 pesos per ton and wood from 13.41 to 15.17 pesos per ton.

From the following theoretical abstractions Argentina's coal situation, up to 1942, may be deduced: 1.) Coal is extremely bulky and storage capacity, sufficient to have a marked effect on production, would require a prohibitive investment. Storage of bituminous coal is subjected to the risk of spontaneous ignition as well as a loss of heat value of the coal. Anthracite may be stored for long periods without any appreciable loss of heat value, and the same thing is true of coke.[50] 2.) Differences in the quality of coal in one region compared with that of another sometimes lead to marked differences in the length of haul. As a rule, coal of high quality will bear a higher transportation charge than coal of low quality.[51] 3.) In the case of coal, costs are lowest at the mines, and advance rapidly with increasing distance from the coal fields by rail, but less rapidly at points served by water transportation.[52] And lastly, 4.) because of the bulkiness of the coal and its low value, the market tends to be localized except where low-cost transportation is available.[53]

That Argentina has normally imported almost 100 per cent of her coal chiefly from Great Britain is related to various significant geographic circumstances. British coal is of high quality, and thus had a low

---

[50] National Resources Committee, Energy Resources and National Policy (Washington, D.C.: 1939), p. 79.

[51] National Resources Committee, op. cit., p. 80.

[52] National Resources Planning Board, op. cit., p. 164.

[53] National Resources Committee, supra, p. 79.

shipping cost per unit of heat. It was produced in areas largely adjacent to the sea, the rail haul to shipping ports being, as a result, a minor item of cost. Hard steam coal came in from the tidewater deposits in Southeastern Wales, around Cardiff and Swansea. An economic basis of exchange made the trade in coal highly profitable not only to the British, but to the Argentine as well. The British grain elevators have a storage capacity of only 6 months duration, therefore, cargoes of grain must move into the ports every month in the year to supplement the stocks of cereals on hand. The British also had the highest per capita consumption of meat in the world, little of which was produced at home. Argentina's superabundance of wheat and corn and large tonnages of frozen and chilled meats have found a ready market in Britain. Furthermore, since the coal reserves in Argentina have proven to be of low quality and inaccessible from the large consuming centers, costs of production have been very high, and mining negligible, except in times of extreme emergency. Wisdom has directed the Argentine wholesaler to purchase imported coal from Britain rather than buy domestic coal. Thus, coal could be imported every month in the year, being an out-cargo on the British tramps going to the River Plate after cereals and meats, and thereby reducing the amount of coal storage space needed.

Bilateral trade practices have been completely altered since World War II occurred and may entirely cease in the post-war years. Since Britain no longer dominates the export coal trade of the world, causes some to doubt that the British economy will ever again be swayed by the proceeds from the coal industry.[54] Argentina has looked to the United States as an alternative source, but little encouragement has been forthcoming. The

---

[54]"The British Coal Industry," Fortune 34 (October 1946), pp. 115-121.

United States never was interested in building up a reputation as an exporter of coal because the deposits have interior locations, and thus the c.i.f. price in Buenos Aires would be normally prohibitive. A lucrative trade was carried on with the Union of South Africa during the War, especially during the latter years in 1943 and 1944. A few carloads of coal came in since then from Colombia.[55] An agreement has been signed with the Union of South Africa whereby the latter was to supply Argentina with 250.000 tons of coal, during the 5 months, August to December, 1946, and Argentina was authorized to export to South Africa 250.000 tons of maize in the same period. The Union of South Africa needed to import maize because unfavorable harvest conditions had occurred. No mention was made of prices at which these products were made available.[56]

It would seem expedient to suggest that the probable solution to Argentina's present-day coal situation lay not in attempting to extent new sources of foreign coal, but rather in developing her own reserves, and further substituting fuel oil for coal. According to Bain, 1 ton of fuel oil has the heat equivalent of 1 and one-half tons of coal (3.6 bbl. fuel oil = 1 ton of coal).[57] Technological advances in the more efficient utilization of energy resources, and especially oil, keep moving on.

The Government in Argentina has shown its willingness to encourage local coal production by passing a Decree in April 1946, the introductory paragraphs to which are quoted below:

Considering:

---

[55]On December 9, 1942 a boat of the Argentine State Merchant Marine arrived at Buenos Aires with a cargo of 6.700 tons of Colombian coal. Colombia has large deposits near the Pacific Coast. Bull. Pan Am. U. (May 1943), p. 298.

[56]See Chapter II of this dissertation.

[57]Bain, op. cit., p. 177.

That the coal mining industry in Argentina has in recent years reached an appreciable stage of development, and that it is necessary to promote the intensification of this activity - since the recession in the operation of this source of national wealth is due not so much to lack of capital investment as to uncertainty as regards the economic future of the industry;

That this uncertainty is due to the absence of any system of protection, and that formerly coal was imported, for the most part, at extremely low shipping freights, by reason of the nature of our foreign trade which demanded a large volume of shipping for the export of grain and meat, and required only relatively little space for imports of machinery, etc.;

That the state should contribute to the development and protection of the country's coal mining industry, and that this encouragement should also cover railway freights, to avoid the full charge being borne by the mining industry;

That to these ends a system of protection should be evolved to establish a minimum quantity of Argentine coal which should be purchased in proportion to the consumption of imported coal;

That the State should encourage the national use of Argentine coal, paying a bonus when it is not used as fuel, but as an industrial raw material.[58]

This Decree may mean hardship to some of the railroads. Locomotives used on the British railroads were designed to use Welsh Steam coal, that is, the size and proportion of the furnaces were based on the assumption that high grade Welsh coal would be the fuel used. In some cases liquid fuels and other types of coal may be used. With some sacrifice of load and speed Argentine wood fuel can be used. At present there are only some half-dozen types, less than 60 units, on the broad-gauge lines that are able to use other types of coal.[59]

If the Argentine Government purchases outright the British railroads in Argentina, as it is rumored, it will probably be necessary for them to purchase new rolling stock. It would not seem too overly optimistic to suggest that diesel engines, and electrically driven trains (upon the development of hydroelectric power sites) might grace the ribbons of steel

---

[58] Rev. of the River Plate, op. cit. (May 10, 1946), p. 42.

[59] Ibid., C, No. 2825 (February 1, 1946), 12.

in that country in the not-too-distant future.

Power.--Hydroelectric power, the least utilized of the energy resources of the Nation, has great potentialities as a source of power for future industrialization. Water power, as a source of energy, affects and is affected by the available mineral fuels, but differs from them in that it is a renewable natural resource and is theoretically wasted if not used. Only a very small percentage of the potential water power reserves of the country has ever been developed. This is due largely to the location of the most advantageous sites at great distances from the centers of population and industry.

Of the total electric power generated in 1941, which amounted to almost 3.000.000.000 kilowatt-hours, with a consumption of 2.500.000.000 kilowatt-hours, 83 per cent were generated by steam, 12 per cent by internal combustion or diesel, and only 5 per cent by hydraulic means.[60]

There has been a gradual increase in the total production of electric current as can be seen from Table XXIII. The production in 1944 was an increase of more than 65 per cent over that of 1935. The fuels consumed by the thermoelectric power plants in 1941 showed an interesting contrast with those used in 1942. In the former year fuel oil and coal, by tonnage, were most employed, with smaller quantities of gas and diesel oil, wood, and coke being utilized. However, the following year one finds that maize was the most used fuel, by tonnage, with much smaller quantities of fuel oil, coal, charcoal, wood, gas and diesel oil, but a still much smaller amount of coke being consumed (Table XXIV).

The work of the "Compañía Argentina de Electricidad" which supplied electric light and power to Greater Buenos Aires is commendable in attempting

---

[60] Jorge Magnin, Combustibles y Fuentes de Energía. (Buenos Aires: 1944), p. 73, and Estadística Industrial de 1941, op. cit., p. 325.

TABLE XXXII

PRODUCTION OF ELECTRIC CURRENT IN ARGENTINA*

Year	Millions kwh
1935	1.661
1939	2.461
1940	2.590
1941	2.684
1942	2.773
1944	2.833

*Schenk, op. cit., pp. 60-61.

TABLE XXIV

CONSUMPTION OF VARIOUS TYPES OF FUELS
BY POWER PLANTS IN ARGENTINA
For the Years 1941 and 1942*

Type of Fuel	1941	1942
	T. Tons	
Fuel oil	473	307
Gas & diesel oil	51	52
Coal	393	242
Coke	23	14
Wood	46	76
Charcoal	...	135
Maize	...	1.169

*Schunk, op. cit., p. 81.

to keep their plant in operation during the War. They set about to build up their stocks. Up to October 1945, quantities of combustibles received at the plant were as follows: 2.866.000 tons of cereals, 535.000 tons of linseed and oil-seed residues and sundry, 606.000 tons of charcoal, and 113.000 tons of linseed oil. This plant alone used during the World War II more than 4.000.000 tons of substitute fuels equivalent to 2.400.000 tons of coal.

There is a point to be made in connection with the geographic distribution of energy produced. The Central Agglomeration, the manufacturing heart of Argentina, was by far the major producer of energy in kilowatt-hours in 1941, accounting for 94 per cent of the total kilowatt-hours produced in the entire country.[61] The largest part of the industries in the Federal Capital, Avellaneda and suburbs, used electric power as motive force. This seems only logical because most of the power plants were situated in favorable locations for the utilization of cheaply imported fuel oil and coal. Transmission distances to the market were short, and the market was extensive in scope, and as one might expect, the cheapest electricity in the Nation was available at only 7 centavos per kilowatt-hour for industrial uses.[62] The power plants, therefore, supplied more than nine-tenths of the demand for electric current.

The situation was very different in areas such as that of Tucumán, Jujuy, and Chubut. In those regions about 95 per cent of the electric power were generated in the establishments using the power. This is because the power sites were scattered, transmission distances were great, and the resultant costs higher than on the littoral. Plants in those

---

[61] Estadística Industrial de 1941, op. cit.

[62] Pedro Brumenge, Energía Hidroeléctrica (Buenos Aires: Comité Argentino de la Conferencia Mundial de la Energía, 1945), p. 26.

interior locations were able, however, to utilise residues, as for example bagasse (Tucumán, Salta, Jujuy), wood, quebracho sawdust and oil-seeds (Chaco and Formosa), grape skins (Mendoza) and petroleum residues (Chubut).[63]

Table XIV shows in detail the actual hydraulic situation in terms of horsepower and in kilowatt-hours of electric energy generated by the plants in the various provinces and territories of Argentina in 1941.[64] It will be noted that the Province of Córdoba had, by far, the largest capacity in horsepower and correspondingly generated the largest number of kilowatt-hours of electric energy. Mendoza held second place, and Tucumán third place. These three provinces accounted for more than 85 per cent of the total kilowatt-hours of energy generated from waterpower in the entire country.

Certain projects have been planned for the Province of Córdoba. The names of these projects and their corresponding horsepower are as follows: Río Primero (Embalse San Roque) - 20.000, Río Segundo - 35.000, Río Tercero - 35.000, Río Cuarto - 5.000, Cruz del Eje - 3.000, and La Viña (Pichanas, Piedemonte, Sato and Guaynacate). The total projected power developments amounted to almost 134.000 horsepower.[65]

As Dorfman[66] has pointed out there are considerable possibilities of growth of the Argentine hydraulics in order to produce electric energy, but there are only some 46.000 kilowatt in exploitation today, equivalent

---

[63] Brunengo, op. cit., pp. 26-27.

[64] One horsepower = 0.746 kilowatt.

[65] Dorfman, op. cit., p. 12.

[66] Ibid., pp. 119-120.

TABLE XXV

ARGENTINE HYDRAULICS, 1941*

Power Plant	Power kw	Energy Generated T. kwh
Córdoba		
Dique Mallet	1.200	5.546
Casa Bamba	4.000	15.670
La Calera	5.000	20.021
Villa Belgrano	80	151
Cosquín	350	626
Valle Hermoso	600	293
Alta Gracia	250	893
La Cassada (Río Tercero)	960	4.539
Primera Usina (Río Tercero)	10.000	...
Lucio V. López	700	1.325
Carcarana	300	6
Mendoza		
Cacheuta	9.000	46.280
Lujan	1.300	4.449
Godoy Cruz	320	298
Tucumán		
Lules	6.250	15.547
Total	40.310	115.644
San Juan		
Zonda	280	1.164
Concepción	170	448
Jujuy		
Río Grande	270	1.164
Tilcara	240	173
San Luís		
La Chacras	450	611
Salta		
Rosario de Lerma	260	278
Catamarca		
La Carrera	180	133
Andalgalá	100	95
La Rioja		
La Rioja	690	806
Other plants	3.000	13.480
Total	5.640	16.352
GRAND TOTAL	45.950	133.996

*A. Dorfman, Encuesta Continental Sobre Fomento y Coordinacion de Industrias, en. sit., pp. 119-120.

to 63.000 horsepower. The plants in Mendoza, that were formerly the most important in the country, have been surpassed by those of Córdoba. Among those which merit special attention are the plants located on the Río Tercero, property of the State whose total power will reach 35.000 horsepower. Of these plants, only one, the "Primera" is especially utilized by the Military factories established in the town of Río Tercero; the corresponding transmission lines were completed in 1941. Recently, ample projection of other works for the "Segunda" plant were approved, that will be in condition to function once they can get the equipment. Similar circumstances occur in the growth of "Cruz del Eje" (3.000 horsepower) and "La Viña" (30.000 horsepower), and enlargement of the "Embalse San Roque" on the Río Primero, that will increase its potential to 20.000 horsepower. Once completed the plants under construction and those projected, all financed by the State, the Province of Córdoba will contain an installed power of more than 133.000 horsepower.

Varied estimates of the potential hydroelectric power of the country are to be had. Professor don Carlos Wauters, engineer, estimated the total potential hydraulic power of the country amounted to an equivalent of 90.000.000 horsepower. The engineer, Adolfo Niebuhr, made a very conservative estimate of 20.000.000 horsepower. Luciano R. Catalano, Director Presidente del Consejo de Administración de la Dirección de Minas, Geología y sus Industrias de Córdoba, offered a more liberal estimate of 40.000.000 horsepower. He felt that if an over-all survey were made of the hydrology of the Nation, there would be sufficient potential hydroelectric energy to supply all industry.[67]

To use Niebuhr's estimates of potential energy it is apparent that the

---

[67] Luciano R. Catalano, Plan Argentino de Movilización Industrial (Buenos Aires: 1943), p. 27, and Brunengo, op. cit., p. 41.

greatest potentialities for waterpower development are in the Territories of Santa Cruz, Chubut, Río Negro, Neuquén, and the Province of Mendoza, and on the international rivers (Ríos Uruguay, Paraguay, Pilcomayo, Alto Paraná, and Iguazú). The Provinces of Buenos Aires and Entre Ríos are far down the list while the Province of Córdoba holds an intermediary position. The Provinces of Santa Fé, the Territory of Chaco and the Province of Corrientes have no potential hydraulic resources (Table XXVI).

As to the future zones of development, there are four that hold possibilities.[68] These are: 1.) the Andean Cordillera of San Juan, Mendoza and Neuquén, especially the falls of "San Martín de los Andes," 2.) the great falls in the international rivers: the "Cataratas del Iguazú" in the Iguazú river, the "Rápidos Apipé" in the Alto Paraná river, and the "Salto Grande" in the Uruguay river; 3.) the central part of the country, especially on the Ríos Primero, Segundo and Tercero in the Sierras de Córdoba; and 4.) the Patagonian coasts where tides can be utilized, according to the Academy of Sciences of Buenos Aires (Fig. 10).

In the Andes, the "Altas Caídas de Mendoza" and those to the south, "San Martín de los Andes" are most significant. The potential energy that could be generated from the latter is said to be nearly 10 times the amount produced in the entire country according to Engineer Bailei Wyllis, who carried out research for the Argentine Government more than 20 years ago, this zone will be the one of greatest industrial potentialities in the entire country.[69]

The "Salto Grande" on the international boundary between Entre Ríos and Uruguay is approximately 450 kilometers in direct line from Buenos Aires.

---

[68]Cristia, op. cit., pp. 90-91, and Magnin, op. cit., p. 73.

[69]Cristia, op. cit.

TABLE XXVI

HYDRAULIC RESOURCES OF ARGENTINA*
(According to Nieburr)

Province or Territory	Surface km^2	Potential T.kw	Density kw per km^2
Santa Cruz	243.943	4.300	17.6
Chubut	224.686	1.900	8.4
Neuquén	94.078	1.500	16.0
Mendoza	150.839	1.500	10.0
Río Negro	203.013	1.000	5.0
Tierra del Fuego	20.912	800	38.2
Misiones	29.801	800	27.0
Catamarca	71.931	700	9.7
Córdoba	168.854	500	2.9
Salta	129.754	500	3.8
Jujuy	43.665	500	11.3
San Juan	86.137	400	4.6
La Rioja	92.231	400	4.3
Los Andes	62.642	300	4.7
La Pampa	143.440	300	2.0
Buenos Aires	307.569	300	1.0
Tucumán	22.524	200	8.8
San Luis	76.748	100	2.0
Santiago del Estero	135.254	100	0.7
Formosa	74.536	100	1.2
Entre Ríos	76.216	100	1.3
Santa Fé	133.007	0	0
Chaco	99.633	0	0
Corrientes	89.395	0	0
Total	2.780.880 (1)	16.300	...
Ríos Uruguay, Paraguay, Pilcomayo, Alto Paraná, & Iguazú	...	3.700	...
GRAND TOTAL	...	20.000	7.2

*Brunengo, op. cit., p. 41.
Note: (1) includes 192 km^2 of the Federal Capital, but excludes the islands.

Falling within its radius would be the Provinces of Entre Ríos, Corrientes, much of Santa Fé (with centers of consumption such as the towns of Santa Fé, Paraná, and Rosario), and the northern part of the Province of Buenos Aires including the Federal Capital. It has the distinction among the great falls of the country of being closest to Buenos Aires. An agreement for the joint development of hydroelectric power of the Uruguay River was signed in Montevideo in December 30, 1946. The cities of Concordia (Entre Ríos) and Salto (on the Uruguayan bank) owe their location to the Salto Grande rapids. Beneficial effects of such a development would be to extend irrigation for the production of rice and citrus. Modern high voltage lines would permit electric power to be carried to all parts of the Republic. With modern high-tension transmission - of the order of 500,000 volts, a super power-house at about Concordia would have an economical range of some 2,000 miles so that the whole of the Republic would be within access to it and even should the production of current prove insufficient for the needs of an industrialized country, at any rate a very considerable reduction in cost would result.[70]

Similar conditions surround the future utilization of the other two great falls located on international boundaries of the country. The "Saltos Apipé" in the Alto Paraná, is located on the boundary between Corrientes and Paraguay at a distance of about 1,000 kilometers from Buenos Aires while the "Cataratas del Iguazú" in the Iguazú river are located on the boundary between Misiones and Brazil, distant by some 1,200 kilometers from Buenos Aires.

In the center of the country the dams already constructed on the Ríos Primero and Tercero, as well as those that are being constructed, "La Viña"

---

[70] Rev. of the River Plate, CII, No. 2573 (January 3, 1947), 8-9.

and "Cruz del Eje," and others, will permit irrigation of large areas of Córdoba in addition to supplying large amounts of electricity. Those will be of major use to the city of Rosario.

Weighing all factors, there would be need for much reallocation of industry should the future motive force have to be derived from the water-power resources of the country since the most advantageous sites have interior locations. That oil production has already passed its maximum output and has experienced a recession, plus the marked curtailment of coal imports has resulted in another dilemma for the Argentine industrialists.

Transmission of electric power has attained a maximum distance today of 250 miles; this will be extended, however, with time. Or, stating this fact in another way, it has been proven that electricity may be economically conveyed by transmission lines a distance of 200,000 square miles centered on the fall.[71] According to the findings of the National Resources Committee:

> With the advent of electrical transmission, availability of the energy of falling water becomes technically possible anywhere within reach of transmission from the power site; and from purely local availability that reach has spread so much that energy from a waterfall came to be available in the course of time 100,200, and on toward 300 miles from the fall. The same distances, of course, hold for a steam-electric plant. But, whereas, formerly, the choice was between water power at the fall only and steam power almost anywhere water power and steam have become alternative possibilities within transmission distance from the fall, i.e., say, somewhat over 250 miles (a tested distance) for a large power site.
>
> Within range of transmission from power sites, water power is directly competitive with fuels as a source of energy. Moreover, even though energy from water may not practically be used at present more than 200 or 250 miles from the power site, industry can gravitate into the orbit of a water power site. Therefore, indirectly, water power is competitive quite beyond the economic limits of transmission.[72]

---

[71] National Resources Committee, op. cit., p. 25.

[72] National Resources Committee, op. cit.

A decentralization of industry in Argentina would be necessary if and when the time might ever come that manufactures would have to rely entirely on hydroelectric power generated from hydraulic sources. This suggestion warrants scientific investigation on the part of the Argentines.

Economic feasibility depends on cost and revenue. Too frequently, construction costs are unknown because the site has not been geographically analyzed. The potential revenue depends on the power output and the size of the market. The size, location, and characteristics of the market must be assumed. This assumption is based on the assumed competitive cost of power delivered to this assumed market from an assumed alternative source, usually a steam-electric plant operating with fuel at an assumed price.[73]

Hydroelectric generating costs depend largely on the rate of interest since the capital outlay for such an undertaking is large. On the other hand thermoelectric generating costs are governed by the cost of labor needed to operate the plant and produce the fuel.[74]

Regional planning surveys must be carried out by the Argentines in much more detail than the Armour Research Foundation was able to realize in their limited time, patterned, perhaps, after those made by the National Resources Committee and the National Planning Board in the United States. Such studies are needed to assure future utilization and conservation of the power resources of the Nation.

"Las Cataratas del Iguazu," is reputed to have the greatest simultaneous water discharge of any body of falling water in the world,

---

[73] Ibid., p. 26.

[74] Bain, op. cit., 143.

including Niagara and Victoria Falls.[75] These falls, along with the other principal sources of hydraulic energy of the country are so distant from the large consumption centers as to make the present transmission of generated power uneconomic. A ray of hope, insofar as the utilization of these wasted sources of energy is concerned, is found in the technological research now being carried on, as may be gleaned from the following statements:

> Technological changes now in prospect that may affect the feasibility of water power include those relating to long-distance transmission of electric energy. Repeatedly, the engineering limit of transmission has been driven back. Twenty years ago, it was generally felt that the practical engineering limit had probably been reached and that that limit was about 200 miles. Ten years ago, a bold designer would have placed the distance at perhaps 300 miles. Today it is known that we can design, build, and operate lines longer than are justified by immediate economic conditions. When power can be transmitted economically several hundred or a thousand miles, important water-power sources will become available that are now too distant from existing markets to be considered.
>
> Transmission in the near future of larger amounts of power to much greater distances and at higher voltages than at present is already definitely foreshadowed by the bold engineering advances that made possible the 266-mile heavy-duty line now operating successfully at 287,000 volts between Los Angeles and Boulder Dam. This line was pioneered, designed, built, and is being operated by engineers of the city of Los Angeles with the cooperation of the United States Bureau of Reclamation. High-tension transmission of direct-current power, now in a late experimental stage, may further widen the technical limit of transmission distances and reduce the cost.[76]

Quite in contrast to Argentina's situation,[77] Brazil has an installed energy 17 times that of Argentina and has the additional advantage of

---

[75] Bain, op. cit., p. 143.

[76] National Resources Committee, op. cit., pp. 305-306.

[77] The principal sources of potential hydroelectric power and their relative distances in kilometers from Buenos Aires are: Salto Grande - 450, Apipé - 1.000, Iguazú - 1.200, Mendoza - 1.200, and Córdoba - 900. Brunengo, op. cit., p. 65.

having the plants located within 50 to 100 kilometers from Sao Paulo and Rio de Janeiro. Uruguay also has cheap power, having completed a plant on the Rio Negro in the geographic center of the country.[78]

The future development of electrification of the Argentine territory has been discussed by Sorojovish who estimated the probable production of electricity to be 6.825.000.000 kilowatt-hours by 1955 (2.643.000.000 kilowatt-hours in 1941), or an increase of 224 per cent over 1941. "If it is considered that the consumption of current has increased from 1939 to 1943 by some 30 per cent, or 7.5 per cent a year," says he, "it may be assumed that the increase calculated for 1955 is 209 per cent over that of 1943, or some 20 per cent a year."[79] He feels that there will be an expanded market for electricity in agriculture, possibly in the electrification of railroads and certainly in industry.

The failure of the Argentine Nation to develop more fully its fuel resources and hydroelectric power sites, and the heavy dependence on imported solid fuels because they were cheaper has placed the country in a position of economic dependency. In times of shipping shortages industry and transportation both have suffered shut-downs or a reduction in efficiency because of the use of substitutes.[80]

Government measures.--During the last War fuels were the only products of domestic origin for which rationing was necessary. In October 1940 a

---

[78] Ibid.

[79] A book entitled "La Electrificacion de la República Argentina y su Proximo Desarrollo," by Gustavo Sorojovish was reviewed in an article entitled, "The Electrification of Argentina: What the Country's Light and Power Needs May Be in 1955," Rev. of the River Plate, XCVII, No. 2767 (December 22, 1944), 15-18.

[80] During the last War it was necessary to substitute firewood for petroleum in the locomotives with the following results: locomotives had to be fitted with spark arresters; with petroleum a locomotive could make a run of 700 kilometers, but only 200 kilometers with firewood and needed fresh supplies and shed attention 3 or more times in that distance.

The effect of wood burning on the general traffic flow is interesting. In peace time the flow of fuel was outwards from the ports or

National Fuel Commission (Comición Nacional de Combustibles) was formed to handle the importation and allocation of fuels. Consumption of coal by the railroads in 1941 was restricted to 60 per cent of that of 1940, and consumption by electric power plants to 85 per cent. Importers of coal and other fuels were requested to purchase corn for use as fuel. In July 1942, the Office for the Distribution of Fuel (Oficina de Distribución de Combustibles) was created to replace the above Commission, under the supervision of the Ministry of Agriculture. Continued use of substitutes for imported coal was encouraged as well as the reduction of working hours in certain factories. Their chief concern, however, was with petroleum and its derivatives. In August 1942, the sale of gasoline on Saturdays, Sundays and holidays was prohibited. Later, a system of gasoline rationing for the entire country was put in vogue. By Decrees in 1942 and 1943, the commercial use of electric power was regulated in order to conserve the already-dwindling stock piles of fuel.[81]

The present Argentine Government has admitted that the weak spot in the economic structure of the country, the provisioning of power, did not become apparent until the fuel imports were curtailed during the Second World War. There are two motives back of its present plan, namely, speedy development of sources of electric power within the Nation, and reduced

---

refineries to the locomotive depots, and cars carrying coal were available for a return load of grain. During the war the flow was reversed and the wood for raising steam for hauling the paying loads came along the same routes used by the paying loads and in cars which were no longer earning revenue. Added to the congestion of single tracks caused by these extra fuel trains, some 20 to 30 per cent of the available cars were used in carrying fuel to supply steam to haul the remaining 70 to 80 per cent.

Train delays were numerous since the heating quality of wood was only about 30 per cent that of good coal or petroleum, thus three times the amount of fuel had to be burned to perform the same work at the same time. John Foale, "The War and the Argentine Railways," Review of the River Plate, XCVII, No. 2765 (December 29, 1944), 14-15.

[81] U.S. Tariff Commission, op. cit., pp. 38-40.

dependence on foreign sources of fuel. A National Power Department has been established with broad powers in all stages of the process of harnessing power resources from the surveying of resources to their distribution and consumption. It will function through Executive bodies having to do with the State Oilfields Department, and the Departments of Gas, Electricity, Fuel, Vegetable Fuels and Derivatives and Solid Mineral Fuels.

"The use of our hydro-electric resources is a basic consideration of the national electrification plan, of which the Executive Power will undertake the development and ultimate completion," thus spoke President Perón in his Presidential Message to Congress.

The National Electrification Plan calls for the construction of plants in 14 provinces and 6 national territories to take place over a 15-year period (1947 to 1961) with a view to increasing power available from 45,000 kilowatt to nearly 1,400,000 kilowatt. The special power sites to be developed are the Salto Grande on the Uruguay River, the Apipé Falls on the Upper Paraná, and these on the Rivers San Juan and Mendoza.[52]

Résumé of the Mineral Resources for Production of Iron and Steel in Argentina

Argentina is believed to have large reserves of iron ore. Refractory clays are in existence as are dolomite, limestone and fluorspar necessary for flux in a blast furnace or open-hearth furnace. There are also certain known deposits of minerals essential to the manufacture of alloy steels, which are: chromium, columbium, copper, manganese, molybdenum, nickel, tin, tungsten, vanadium and zinc.

Geology of major mineral region.-[53]There are four regions in which

---

[52]"The Argentine Five-Year Plan: Fuel and Power," Rev. of the River Plate, CI, No. 2566 (November 15, 1946), 20, 22-26 and 49-52.

[53]Foreign Minerals Quarterly, op. cit., pp. 11-12.

most all the minerals may be found, The Cordillera of the Andes and the Cordillera Patagonica, The Precordillera Range, The Sierras Pampeanas, and The Puna.

The Cordillera of the Andes and the Cordillera Patagonica.-These two chains of mountains form Argentina's Western boundary. They rise to more than 20.000 feet, and are composed of Paleozoic strata, principally quartzite, graywake, and sandstones, intruded locally by batholythe and granite. Overlying these formations to the east are the Mesozoic sandstones, limestones and slates intruded by granodiorite and porphyry. The Mesozoic formations are in turn overlain locally by lavas and tuffs of more recent age and intruded by stocks of andesite and dacite.

Mineralization along the Andes occure in small, scattered deposits of copper, gold, lead and silver, in or near the andesite or decite intrusive masses, and some tungsten deposits are found in the older rocks in the western part of San Juan and Mendoza provinces.

The Precordillera Range.-This range is the parallel range to the east in the Provinces of Mendoza, San Juan, La Rioja and Catamarca. It is composed of Paleozoic quartzite, slate and limestone strata, varying from Silurian to Carboniferous age. Overlying these locally are small areas of Mesozoic sandstones and Tertiary sedimentaries and instrusives. Along this range the mineral deposits consist of gold, lead and silver.

The Sierras Pampeanas.-These ranges lie farther east and rise out of the Pampas, in the Provinces of San Luis, Córdoba, La Rioja, Catamarca, and Santiago del Estero. They consist of several north-south disconnected ranges, and are composed of ancient crystalline schists, phyllites, and gneisses which are overlain by later Paleozoic and early Mesozoic sedimentaries. These are intruded by extensive areas of diorite and granite as well as dikes and pegmatite and aplite. The more recent intrusive and extrusive andesite dacite occur.

Mineral deposits consist of tungsten, manganese, bismuth as well as deposits of beryl, spodumene, mica, quartz and feldspar that are being mined today; and of copper, gold, lead, silver and tin ores that have been mined in the past.

The Puna.--The Puna group lies in the Provinces of Los Andes, Salta and Jujuy in the extreme northern part of Argentina where the three ranges unite in an uplift of high mountains without the intervening valleys. They are composed of quartzites, shales and limestones of Paleozoic age. These are intruded by granite and granodiorite which form the backbone of some of the ranges and by local masses of andesite, dacite and basalt along the western border with Chile. This is the most valuable mining region in Argentina. Lead, zinc, tin, silver, gold, iron ore, sulphur and salt are among the more important minerals found there.

Ferrous resources.--Known deposits of iron ore occur in widely scattered areas along the eastern flanks of the Andes, and in the Sierras de Córdoba, remotely situated from railroad lines, with tonnages too small to warrant expenditures for improving the transport facilities.

Small deposits occur in most of the provinces either as veins of hematite (Fe_2O_3) or limonite ($Fe_2O_3.H_2O$) up to 10 feet wide, or as masses of magnetite (Fe_3O_4) up to 100 feet or more across. All the ores are relatively low in iron (Fe) and high in silica (SiO_2).

There is no coal suitable for the reduction of these ores to pig iron in the environs of the mines or elsewhere in Argentina.

The ore occurs in the schists, in many places near granite intrusive masses, in the Provinces of Mendoza, San Juan, La Rioja, and Catamarca. The ore also appears in certain sedimentary beds in the Province of Buenos Aires, and in the Upper Paraná river area in the Province of Jujuy. None of these deposits has proved to be of commercial value.

Of the many scattered iron deposits that occur in parts of western and northern Argentina, the largest of the known deposits are: the "Filo de la Cortadera" and the "Visvil" in Catamarca; the "Lagunilla" in Salta; the "Hierro Indio" in Mendoza; and, the "Sierra de Zapla" in Jujuy. The capacity of the latter was discovered and developed during 1941, and was believed to be the most extensive deposit in the Nation (Figure 15).[84]

The hematite deposit, "Filo de la Cortadera," with some magnetite in gangue of granite, 160 meters long and up to 1 to 30 meters wide, lies 25 kilometers northeast of Tinogasta at an altitude of 2.400 meters, in the Province of Catamarca. The probable ore reserves to a depth of 100 meters was estimated by Lannefors to be 300.000 tons of ore of from 25 to 30 per cent iron.[85]

The mine "Visvil," 35 kilometers to the northwest of Andalgalá, Provinces of Catamarca, near the confluence of the Atajo and Visvil rivers, 2.000 meters altitude, contains hematite free from magnetite and sulphur with quartz as gangue mineral. The average mineral content 59.20 per cent Fe and 5.28 per cent silica residue, and is free from sulphur and phosphorus. That mine was worked until 1925.[86]

"Hierro Indio," is another iron mine, 35 kilometers southwest of El Sosneado, department of San Rafael, Province of Mendoza at an altitude of 2.500 meters. Several deposits of magnetite occur there in a granite contact zone and vary from 2 to 5 feet wide and up to 100 feet long.

---

[84] República Argentina, Ministerio de Agricultura de la Nación. Dirección de Minas e Geología. Los Yacimientos de Minerales y Rocas de Aplicacion de la República Argentina. Bol. 50. (Buenos Aires; 1941), p. 107, and Estadistica Minera de la Nación 1941, op. cit., p. 25.

[85] Supra, p. 112.

[86] Los Yacimientos de Minerales y Rocas de Aplicacion de la República Argentina. op. cit., p. 111.

GOODE'S SERIES OF BASE MAPS
HENRY M. LEPPARD, EDITOR

FIGURE 15

Prepared by Henry M. Leppard
Published by the University of Chicago Press, Chicago, Illinois
Copyright 1941 by the University of Chicago

Analyses made by Chaudet for the Dirección de Minas y Geología showed a silica gangue of 5.75 per cent, hematite (Fe_2O_3) 90.10 per cent, iron (Fe) 63.10 per cent, ferric oxide in Fe_2O_3 44.60 per cent, saline oxide of iron (Fe_3O_4) 44.07 per cent, and only traces of titanium and calcium, but none of phosphorous or arsenic, all of which speaks in favor of its great purity.[87]

The estimated reserve of the "Hierro Indio" mine was 368.000 tons. while that of the entire Province of Mendoza was 386.000 tons, which averaged a content of 60 per cent metallic iron.

Wood is not abundant in that region, but the supply of water is adequate. Another disadvantage to the development of the deposits is the remoteness of the "Hierro Indio" mine, inasmuch as it can be reached only by primitive methods of transportation. The construction of a road is not justified at present because the quantity of recoverable mineral is not great enough. The beds can only be considered a reserve in case of extreme necessity.

There are outcroppings of iron ore veins, hematite with small percentage of magnetite, mostly averaging 45 per cent iron, at an altitude between 3.700 and 3.900 meters, in the department of Rosario de Lerma, Province of Salta, approximately 5 kilometers north of Lagunilla. Analysis made by Lannefors showed an iron (Fe) content 45.24 to 53.58 per cent, silica content of 16.96 to 19.00 per cent, sulphur 0.015 to 0.069, and some phosphorus and manganese.[88]

---

[87] República Argentina, Ministerio de Agricultura de la Nación. Dirección de Minas y Geología. El Yacimiento de Magnetita de Hierro Indio y otros menores del Departamento San Rafael, Provincia de Mendoza. Bol. 52. (Buenos Aires: 1942), p. 21-22.

[88] Los Yacimientos de Minerales y Rocas de Aplicacion de la República Argentina, op. cit., pp. 114-116, and Estadistica Minera de la Nación, 1941, op. cit., p. 25.

Beds of sedimentary hematite were explored in 1941 some 30 kilometers southeast of the city of Jujuy and 10 kilometers east of Papala, in the western edge of the Sierra de Zapla, in the mine by that same name at a height between 1.250 and 1.400 meters. It has been estimated that the average content was 40 to 45 per cent iron (Fe) and 15 to 30 per cent silica (SiO_2).[89]

Of the 9 analyses made by Mario Torre for the Dirección de Minas y Geología, the hematite (Fe_2O_3) percentage varied from 37.0 to 82.9; the iron (Fe) content from 23 to 58; and the insoluble silica (SiO_2) 11.96 to 51.95, per cent, respectively. They contained no phosphorous and only traces of sulphur and arsenic. The manganese content was small, 0.01 to 0.05 per cent, as was also the titanium content, 0.31 to 0.57 per cent.[90]

The reserves to a depth of 25 meters were said to be 800.000 tons of probable mineral. The first estimation of the capacity, of 36.000.000 tons, was made in 1941, and thus these deposits constituted the largest known deposits of iron ore in the country up to that time. The Dirección de Minas y Geología de la Nación was effecting greater examination and a systematic exploration with the object of learning more about the deposits. By 1943 an areal tramway had been completed from the mine to Papalá, a distance of 14 kilometers.

Among the less well-known iron deposits that have been explored were the magnetite deposits of the "Sarmiento" mine at Caracate, 15 kilometers southwest of Olaín, department of Punilla, Province of Córdoba. The ore contained 57 per cent hematite (Fe_2O_3) and 41 per cent silica (SiO_2), and [illegible] occurred at the contact of a granite mass which measured up to 25 meters

---

[89] Ibid.

[90] Los Yacimientos de Minerales y Rocas de Aplicacion de la República Argentina, op. cit., p. 116.

long and 7 meters wide. The capacity of those beds has been greatly reduced through previous workings.[91]

Another deposit, "Aguada del Monte," with veins about 1 mile long and 3 feet wide composed of hematite and limonite is situated 115 kilometers northeast of Quilino, department of Sobremonte, Province of Córdoba, and has been worked intensively for some 20 years. Explorations extended to a depth of 150 feet and the reserves are estimated at 230.000 tons of probable mineral with 25 to 30 per cent iron and 10 to 20 per cent manganese.[92]

Some 10 kilometers west of La Quiaca, department of Yavi, Province of Jujuy, is a deposit of iron and manganese (chiefly hematite and limonite with a high per cent of silica), at a height of 3.592 meters. Two important beds occur with many ramifications, near the La Quiaca River and the bed extending into Bolivia. Limonite and Psilomelana are the principal mineral constituents, with a low content of Manganese. The limonite has a 52 per cent Fe content and 0.50 per cent phospherous content.[93]

Hematite is the great source of iron supply of the world. As previously stated, deposits have been reported along the eastern slopes of the Andes, but with the exception of those in Jujuy the deposits are too small to furnish the daily requirements of a blast furnace. The ore is high in silica, and remotely located. A temporary exploitation of hematite, was made in 1941, of a variety known as hierro oligisto (contains less iron than magnetite) in the Candelaria bed of the region of Compana

---

[91] Ibid., p. 113.

[92] Foreign Minerals Quarterly, op. cit., p. 31, and Los Yacimientos de Minerales y Rocas de Aplicacion de la Republica Argentina, op. cit., p. 113.

[93] Guerra, p. 114.

Mahuida, department of Loncopué, Territory of Neuquén. It was shipped from Zapala.[94]

Laterites are said to be present in Misiones. They have a high moisture and silica content, and often contain constituents that cause much trouble in their utilization. They do not constitute a good source of iron ore.[95]

The production of iron ore has been very small, the record output being in the year 1941 when 3.750 tons were produced, valued at 110.000 pesos. As a result of the closing of the two concentrating plants on the coast of the Province of Buenos Aires, the output declined to 690 tons by 1942, and further to 150 tons by 1943.[96]

Almost all the iron produced in 1941 was magnetite (Fe_3O_4), and came from the Atlantic coastal regions of the Province of Buenos Aires, some 3.740 tons in all. A small quantity of hematite (Fe_2O_3), 10 tons, was produced in the Territory of Neuquén.[97]

Magnetite, forming thin layers and mixed in variable quantities with sand, is extensive over the coastal zones of the Province of Buenos Aires from Mar del Plata to Necochea. The iron content varied from 2 to 10 per cent, and that of titanium between 0.4 and 1.0 per cent and more. Magnetite is heavier than sand and thus the sorting action of the waves tends to concentrate it. The sands have a high titanium content, which makes smelting of the ore difficult. The places of extraction, however, were the beaches of Punta Rubia, bay of San Blas, in the district of

---

[94]Bain, op. cit., p. 192.

[95]Bain, op. cit., p. 192.

[96]Estadística Minera de la Nación, 1943, op. cit., p. 30, and Foreign Minerals Quarterly, op. cit.

[97]Estadística Minera de la Nación, 1941, op. cit., p. 25.

Patagones, and those of Claromecó in the district of Tres Arroyos. (Fig. 15) The concentrates indicated an average quality of approximately 75 per cent magnetite (Fe_3O_4) and 10 to 15 per cent of ilmenite ($FeO.TiO_2$). The cargoes were shipped from the stations of Cagliero and San Francisco de Bellocq.[98]

By 1943 the production of magnetite decreased considerably especially in the Punta Rubia and Miramar districts. The only one in exploitation was situated on the beaches of Claromecó, district of Tres Arroyos, in which place is situated the concentrating plant for the treating and separation of the ilmenite by electromagnetic methods. The purity of the magnetite extracted averaged 36 per cent magnetite (Fe_3O_4), and contained up to 15 per cent ilmenite ($FeO.TiO_2$).[99]

The estimated reserves of iron ore in Argentina are by no means comprehensive, recent, nor consistent, however, the only available data are the following: 1.) Lannefors in 1930 estimated the bed "Filo de la Cortadera," Tinogasta, Catamarca, at 300.000 tons, 2.) Rigal in 1940 estimated the bed "Hierro Indio", San Rafael, Mendoza, to be 368.000 tons, 3.) Burchard in 1925 said the capacity of the limonite crust of Misiones was 200.000 tons, 4.) Angelelli in 1941 gave the figure 600.000 tons of probable mineral to a depth of 25 meters for the beds of the Sierra de Zapla, Jujuy, while the Dirección de Minas y Geología estimated the probable mineral capacity at 36.000.000 tons, 5.) Lannefors in 1930, estimated 80.000.000 tons in the sands between Miramar, Necochea and the edges of the Claramecó river with 5 per cent iron (Fe) and 1 per cent titanium (TiO_2),

---

[98] Estadística Minera de la Nación, 1941, op. cit., p. 26; Los Yacimientos de Minerales y Rocas de Aplicacion de la República Argentina, op. cit., p. 109; and Bain, op. cit., p. 192.

[99] Estadística Minera de la Nación, 1943, op. cit., p. 131.

6.) 470.000.000 more tons of sands in the same area, but of lower content with 2.5 per cent iron (Fe) and 0.3 per cent titanium (TiO_2), and 7.) Catalano has compiled an elaborate estimate of the various known iron beds in the country. It follows in the next paragraphs.[100]

According to Catalano at the end of 1941 (September-October) there was affirmed a positive reserve of 100.000.000 tons of hematite, of 45 per cent useful iron in the beds of Zapla, Jujuy. These estimates were based on scientific and technical methods.

The positive and probable estimates of iron minerals of the Nation that can satisfy the needs of a large national metallurgical industry are: 1.) Huancalara-Zapla-Güemes (Salta-Jujuy), 35 to 45 per cent elementary iron, probably 500.000,000 tons, 2.) Costa Atlántica, sand dunes with hematite-magnetite, 5 to 14 per cent iron, probably more than 5.000.000 tons calculated in concentrates of 60 per cent iron, 3.) Córdoba-Aguada del Monte, 40 to 60 per cent iron, an estimated reserve of no less than 2.000.000 tons, 4.) La Rioja-Cerro Negro and around the nucleus of Famatina, estimated in the siderites, hematites, and magnetites and ferriferous sands, a reserve of more than 50.000.000 tons (in these estimates were omitted the iron of Vilgo, Sierra de Paganzo, Sierra de Guandacol), 5.) beds of hematite around the nucleus of Paramillo, department of San Rafael, Mendoza, of excellent quality that extend to other nuclei not studied, estimated to be more than 1.000.000 tons of magnetite (there exist in Mendoza many places with ferriferous alluvials and with veins of hematite of high quality, whose probable estimation will reveal many surprises in the future), 6.) the discoveries of sedimentary iron (hematite)

---

100 Los Yacimientos de Minerales y Rocas de Aplicacion de la República Argentina, op. cit., 107, 109 and 116; Estadistica Minera de la Nación, 1941, op. cit., p. 25; and Catalano, op. cit., pp. 165-166 and 177.

of Unchimé, Carrapatal, near Güemes, and the veins in the region of Tastil, department Rosario de Lerma, in the regions of Laguniila and Quebrada de las Burras, 45 to 60 per cent iron, and an estimated probable reserve of more than 1.000.000 tons, 7.) in Los Cobres, Province of Los Andes, are beds of hematite and limonite estimated at 2.000.000 tons (other beds of considerable extent, but which require special studies are in Incahuasi and west of Salar del Rincón, and hematite and magnetite of Samenta and the nucleus of Acay), 8.) beds of sedimentary iron and iron veins in Neuquén needing further study are: Agunda del Overo, and Piedra del Aguila and Loncopué, 9.) in San Juan, there are the hematites of Agua Negra, near Ojo de Agua, the pyrites of Sierra de la Huerta and its mutations in limonite, hematite, and alluvials and dunes with hematite, titaniferous magnetite in the fields of San Carlos and in the Sierra de la Huerta, 10.) in Catamarca are the beds of "Filo de la Cortadera" and "Viscil" (discussed above), and 11.) in Misiones, Río Negro and Patagonia are considerable ferriferous manifestations which require studies in economic geology.

An over-all estimate of the minerals of iron of the Argentine, including pyrites, will be no less than 1.000.000.000 tons, calculated with a quality of no less than 50 per cent elementary iron. "The existence of minerals of exploitable iron in our country are positive," concludes Catalano.[101]

The production data for the tonnage of iron put on the market show an interesting decrease in spite of the augmentation in the price. In 1938 the first figures appeared with 2.365 tons valued at 46.000 pesos (19.45 pesos per ton), and by 1939 the tonnage had grown to 3.588 valued at 70.000 pesos (19.50 pesos per ton). The tonnage dropped in 1940 to 2.500,

---

[101] Catalano, op. cit.

valued at 60.000 pesos (24.00 pesos per ton). The following year, that of maximum output, registered 3.750 tons, worth 110.000 pesos (29.33 pesos per ton). The tonnage then took a downward plunge to 690 tons in 1942, valued at 28.000 pesos (31.46 pesos per ton), and a further drop to only 150 tons in 1943, worth 9.750 pesos (65.00 pesos per ton). One may surmise that the limitations placed on the coal supply by World War II may have been partly the cause of such a decrease in production when the price per ton definitely showed the highest figure in the Nation's history. Furthermore, had the extensive deposits of hematite, in Jujuy, for example not been so inaccessibly located the conditions may have been entirely different.[102]

The consumption of the various qualities of iron ore produced in Argentina in 1941 was yet another matter. The total production of magnetite was destined for the cement industry in which it was used as a metal flux added to the clay when the natural content of iron oxide contained in it was sufficient to obtain a fusion point adequate in the crude mixture.[103]

The oligist iron from Neuquén was used in the preparation of special coatings of electrodes for autogeneous or electric soldering.

Almost all the production in 1943 was again used in the fabrication of Portland cement and in the fabrication of electrodes inasmuch as scrap iron continued being the chief raw material in the iron industry.[104]

In 1941 only 5 tons of magnetite were exported, going to Uruguay.

Refractory clays and flux.--These materials whose high fusion points

---

[102] Estadística Minera de la Nación, 1943, op. cit., p. 30.

[103] Estadística Minera de la Nación, 1941, op. cit., p. 26.

[104] Estadística Minera de la Nación, 1943, op. cit., p. 29.

and other special properties permit their use as materials for constructing or lining furnaces, fireboxes, chambers and vessels in which high temperature processes must be carried are known as refractories. They are essential to the operation of foundry cupolas, open-hearth furnaces, ladles, reverberatory furnaces, and the lining of blast furnaces. The blast furnace lining, varies from 15 inches to as much as 4 feet thick and requires a large quantity of fire-clay brick.

The Province of Buenos Aires was the only producer of refractory clays in 1941, registering 19.830 tons, valued at 258.000 pesos. The districts of Punyrredón and Balcarce, due west of Mar del Plata (Fig. 15), furnished the products, all of which were consumed in the country.

By 1942, however, a small tonnage was registered for the Province of La Rioja, from the district Dique de los Sauces, Sierra de Velasco, north of the city of La Rioja, and by 1943, a few thousand tons came from the region Ramón M. Castro in the Province of Neuquén (Fig. 15).

Blast-furnace flux is basic in character and consists of limestone or dolomite, the former being more commonly used. The function of the flux is to promote fusibility of the acid constituents of the charge and to combine with certain of its impurities so that they will not be present in the pig iron produced. The cost of these materials is a small item of the total cost in comparison with the cost of iron-bearing materials and fuel.

The total production of limestone (rocas calizas y calcareas) in Argentina has remained rather constant from 1910 to 1939, being around 100.000 to 200.000 tons. Starting with the year 1941, however, the production jumped to 2.500.000 tons.[105] This was due to the impetus

---

[105] República Argentina. Secretaría de Industria e Comercio. Dirección General de Industria. Dirección de Minas y Geología. Estadística Minera de la Nación, 1943. Publ. No. 130 (Buenos Aires: 1944).

given to the building and construction industries. From the index base of 100 in 1935, the permits granted for private building rose to 160 in 1941 and to 165 in 1942. The value of building work done in 1942 was estimated to be about 900.000.000 pesos, including public works for the sum of 360.000.000 pesos.[106]

Seventy per cent of the limestone produced in that year went into the making of Portland cement. Twenty-four per cent were consumed in the fabrication of lime, and 6 per cent by glass, metallurgy, abrasives and rubber industries.[107]

Beds of limestone together with shale beds interstratified in quartzites of Paleozoic age occur in the area between Buenos Aires and Bahia Blanca. Along the Paraná river are fossiliferous limestone beds of Tertiary age. In the Province of Córdoba and Santiago del Estero marmorized limestone of pre-Cambrian age is mined. In the Province of Salta there is a travertine limestone. In the Provinces of San Luis, La Rioja, Tucumán and Salta and the Territory of Neuquén occur deposits of gypsum in rocks of Tertiary age (Fig. 15).[108]

The Province of Buenos Aires was the leading producer of limestone in the Nation, furnishing more than 54 per cent of the total in the year 1941. The Sierra Baya was the chief source of origin. Other areas were the coastal zone of Río de la Plata, district of Magdalena, and the Sierra de Tandil. Cement and lime factories absorbed the output in these districts.[109]

---

[106] Banco Central de la República Argentina. Eighth Financial Period, 1942. op. cit., pp. 6-7.

[107] Estadística Minera de la Nación, 1941. op. cit., p. 63.

[108] Foreign Minerals Quarterly, op. cit.

[109] Estadística Minera de la Nación, 1941. op. cit., pp. 63-64.

The Province of Córdoba continued being the most important province for the manufacture of high-calcium lime besides Portland cement. The most active cement plants being located in Dumesnil and Malagueño.

Other areas in the country shared in the production of limestone, such as: the Paraná river districts in Entre Ríos, and zones in the Province of Mendoza, Santiago del Estero, Salto, San Juan, San Luis and smaller areas in Jujuy, Chubut, Río Negro and Catamarca.[110]

The total production of dolomite in Argentina in 1941 was 23.913 tons, valued at 72.000 pesos. A decrease took place by 1942 with only 20.500 tons, worth 55.000 pesos, and also again by 1943 when only 17.260 tons were registered, that were valued at 122.000 pesos.[111]

The Province of Buenos Aires produced almost all the dolomite in 1941, and only less than 500 tons were quarried in the Province of Córdoba. The quarries "Loma Negra" and "Amarilla," situated in the Sierra Bayas, district of Olvarria, Province of Buenos Aires were the chief centers of production (Fig. 15). The greater part of the dolomite in that province went into the manufacture of cement, although some 9 per cent were destined to other industrial uses. In the Province of Córdoba, the quarry "El Sauce" continued to be the producer.[112]

Ninety per cent of the dolomite of the Nation went into the cement industry in 1941, in the same place as the quarries, in the Province of Buenos Aires. And, 10 per cent were used for the fabrication of calcinated dolomite necessary for the basic coverings of steel furnaces (revestimiento basico de los hornos de aceros Siemens-Martín), as scorifi-

---

[110] Ibid., pp. 64-65.

[111] Ibid., p. 74; and Estadística Minera de la Nación, 1943, op. cit., p. 12.

[112] Estadística Minera de la Nación, 1941, op. cit., p. 75.

cation in metallurgy, and for the preparation of magnesium salts.[113]

Fluorspar is a flux consumed in the basic open-hearth process. It facilitates fusion and the transfer of objectionable impurities such as sulphur and phosphorus into the slag to which it gives fluidity.

Ninety per cent of the fluorspar produced in Argentina in 1941 were consumed in the country. There was a marked increase in production up to 1941 due to the intensive fabrication of opalescent glass, whose absorption of fluorspar was considerably more than that of common glass, and the steel industry.[114]

By 1943 fluorspar had found additional industrial uses: in metallurgy as a flux for the separation of phosphorus and sulphur; in the glass and enamels industries; in the cement industry; in the chemical industry; and used as antiseptics in the fermentation industries.

The mineral **fluorite** occurs as a gangue mineral and is found in small quantities in numerous beds of wolframite and sheelite, and also in the deposits of cassiterite. It rarely occurs in veins with sulphurous minerals. In the Sierras de Córdoba there are deposits of **fluorite** in granite of Paleozoic age, and in the Province of San Luís in granite and crystalline schists. It is associated with barium sulphate and quartz, the principal gangue in the deposit of galena in the mine "Yamcha," near San Carlos, Mendoza (Fig. 15).

The Province of Córdoba, in 1941, produced 54 per cent of the Nation's supply of fluorspar. There were two productive zones: 1.) the region of San Roque, 15 kilometers west of the city of Córdoba, department of Punilla,

---

[113] Lovering, op. cit., p. 171.

[114] Estadística Minera de la Nación, 1941, op. cit., pp. 94-95; Ibid., 1943, op. cit., pp. 62-63; Los Yacimientos de Minerales y Rocas de Aplicación de la República Argentina, op. cit., pp. 279, 280-281.

in which the mines - "El Potrero," "Buena Ventura," "La Nueva," and "La Ciénaga," and others were the producers. They shipped their products from the stations of Bialet Massé, Yocsina, Malagueño, and Cosquin, and 2.) the mine "Bubu," shipping station Concarán, in San Luís, and the mine "Zaida" and others shipped their products from the stations of Baigorria and Espinillo.

The mines of "La Ciénaga" have been worked for years and have averaged some 350 to 450 tons yearly. They are situated 50 kilometers west of the city of Córdoba, or 13 kilometers west from Villa Carlos Paz, department of Punilla, at about 850 meters elevation. Analyses made by Chaudet for the Dirección de Minas y Geología showed a mineral content of: fluorspar (CaF_2) 99.00 per cent, fluorine (Fluor) 48.31 per cent, silica (SiO_2) 0.20 per cent, and chlorine (Cloro) 0.08 per cent.

In 1941 the first active exploitation of fluorspar was made in the Province of San Luís. The high quality of the mineral and the good roads facilitated the working of the beds already known. The mines placed in operation were: "La Marquesa," "La Italoargentina," and "Bubu," all situated in the Seco River valley in the western side of the Sierra de Comechingones, department of Chachabuco, about 6 kilometers northeast of Larca. The fluorspar produced was violet and green in color, and averaged 92 per cent fluorspar. The shipping station was Concarán.

The mine "La Italoargentina" has a vein from 0.30 to 0.40 meters thick of more or less pure fluorspar, which is emerald green in color. Its production has been very limited because of numerous declivities.

In the higher part of the Sierra de Comechingones, department of Calamuchita is the mine "Bubu," some 11 to 15 kilometers from Larca and 45 kilometers from Concarán, its shipping point. The mine has been worked to a depth of 5 meters, and is known to be some 250 meters in length.

According to analyses made by Chaudet for the Dirección de Minas y Geología the mineral content was: fluorspar 99.20 per cent, fluorine 48.41 per cent, and chlorine 0.07 per cent.

The Province of San Luis produced around 40 tons of fluorspar in 1941 and again in 1943, from the mines "La Esperanza," district of Nihuil, department of San Rafael, and the mine "San Salvador," department of Luján de Cuyo.

The total production of fluorspar in the Nation in 1941 was 2.027 tons. There was an augmentation by 1942, the total being 2.326 tons, but a reduction by 1943, when the entire tonnage fell to only 1.713 tons. The mineral produced averaged 85 to 95 per cent fluorspar (F_2O_a), containing also silicate, iron oxide and alumium, and with a 43 per cent content of fluorine.

Alloying materials.--Steel is an iron alloy that has the property of hardening when quenched from a high temperature. Much steel is iron having less than 1 per cent carbon. To the special or alloy steels, one or more elements have been added to impart special properties. The most common are: manganese, chromium, nickel, molybdenum, tungsten, vanadium, silicon and copper. The special properties sought are hardness, stiffness, ductility, resilience, tensile strength, compressive strength, resistance to fatigue, abrasion or corrosion, and ability to hold a cutting edge at a high temperature. Tin, zinc, titanium, zirconium and columbium are used to a lesser extent in making alloy steels. The effect of the major alloys may briefly be mentioned. Low carbon steel goes into wire, tubing, boiler plates, screws and rivets. Medium carbon steel is used for axles, forgings and machinery steel. High carbon steel is desired for chisels, drills, dies, machine tools and files. Manganese steel is tough and resists abrasion well and is especially suited to rock-crushing

and digging machinery and curved rails. Chrome steel is hard, high in tensile strength, even at high temperatures, and resists corrosion, and thus it is suited to dies, ball bearings, safes, stainless steel and chemical reaction pressure chambers. Nickel steel has unusual elasticity, ductility, toughness, hardness when suitably heat treated and resists corrosion, and therefore it is in demand for armor plate and structural steel, especially bridge work. Molybdenum steel has such qualities as shock resistance, strongness, toughness and hardness, and is best suited for the manufacture of automobile parts, tools and machinery. Vanadium steel is similar to molybdenum steel, but can withstand fatigue and twisting stress, and hence is well adapted to shafting, axles and steel springs. Tungsten steel (hard and tough, retaining these properties even when heated to a dull red) is pre-eminent as a tool steel, armor-piercing shells and permanent magnets. Silicon steel which has high resistance and large magnetic permeability is suited to electrical equipment. Copper steel, similar to nickel steel, is also corrosion-resistant and suited to tubes and sheet metal.[115]

Chromium (Cr_2O_3).--Chromium is one of the most indispensable of the ferro-alloys. It is difficult, if not impossible, to find substitutes for chrome steels that resist corrosion at high temperatures.

The year 1941 was the first time a production of chromium was registered in the Nation, 60 tons were produced in Córdoba and valued at 15,000 pesos at the place of extraction.

All the chromium was produced by the mine "12 de Noviembre" situated on the western side of the San Lorenzo Hill, in the department of Calamuchita. The chromite averaged 35 per cent chromite and was transported

---

[115] Lovering, op. cit.

by road to the Federal Capital (Fig. 15).[116]

There were ample uses for this metal in the metallurgical, refractory and chemical industries in the country, but the entire production in 1941 went into the siderurgical industry.

By 1942 some 210 tons worth 40.000 pesos were produced, and by 1943 the production rose to 250 tons valued at 75.000 pesos. During 1943 other mines were opened up about 100 kilometers west of the city of Córdoba which contributed to the increase of 19.04 per cent in production and 87.50 per cent in value from 1942 to 1943. The average mineral content oscillated around 30 to 37 per cent Cr_2O_3.[117]

An estimation of the reserves made by La Dirección General de Fabricaciones Militares was more than 10.000 tons.[118]

Nickel (Ni).-There are few known deposits of nickel in Argentina. No production figures are available.

In the Province of La Rioja, the mine "Soliteria" in El Jagüel, 65 kilometers west of Vinchina, department of General Sarmiento, has a vein of copper nickel (niquelina) in a gangue of calcite. Another mine is to be found in the district of Valle Hermoso, above the western edge of Famatina, 70 kilometers from Vinchina (Fig. 15). It is an old mine and is known as "Reina Alejandria," in the department of the same name, at approximately 3.500 to 3.600 meters elevation. Analyses made for the Dirección de Minas y Geología show the following mineral contents: 4.79 per cent cobalt (C_o), 0.25 per cent nickel (N_i), 2 g/t silver (A_g), and 6 g/t gold (A_u).[119]

---

[116] Estadística Minera de la Nación, 1941, op. cit., p. 17.

[117] Ibid., 1943, op. cit., p. 22.

[118] Catalano, op. cit., pp. 174 and 177.

[119] Los Yacimientos de Minerales y Rocas de Aplicacion de la República Argentina, op. cit., pp. 127-128.

In the Province of Salta, the mine "Quebrada Blanca" situated 7.5 kilometers north of the valley of the Cóndor, Sierra de Santa Victoria, at an elevation of 4.360 meters, is tapping a deposit of nickel 20 meters long. The principal mineral, copper nickel, is disseminated within the reticula of quartz. Besides there was observed pyrites, chalcopyrite (yellow copper), and hematite.[120]

Analyses of the bed at three different depths show the following mineral content: at 5 centimeters depth - 2.95 per cent N_i and 152 g/t of silver; at a depth of 15 centimeters - 3.77 per cent N_i and 52 g/t of silver; and at 35 centimeters - 6.40 per cent N_i and 60 g/t of silver. The mineral contains no cobalt or gold. The depth of this vein, which outcrops some 5 meters above the level of the ravine, has not been determined.[121]

La Dirección General de Fabricaciones Militares made the first study in economic geology of the bed of copper nickel located in Pachamoyo, in Rodeo de Tuctura, Sierra de Santa Victoria, in the puneña salteña region bordering the Province of Jujuy. It is estimated that this bed has a probable reserve of 5.000 tons of pure nickel.[122]

By May, 1943, a deposit of nickel had been discovered in La Salamanca near Tupungato, Mendoza. A vein of sulphate of iron with an average content of 0.5 to 1.0 per cent seems to be an ample reserve.

In the residues of the asphaltites in Mendoza and Neuquén nickel and vanadium are also found.

---

[120] Ibid., p. 126.

[121] República Argentina, Ministerio de Agricultura de la Nación. Dirección de Minas y Geología. Contribucion al Conocimiento de la Mineria y Geología del Noroeste Argentino. Bol. No. 53 (Buenos Aires: 1943), p. 155.

[122] Catalano, op. cit., p. 173.

The total nickel reserves for the country as a whole have been estimated at 10.000 tons of fine nickel.[123]

Manganese (M_n).--All the manganese ore produced in Argentina in 1941 was consumed in the country by the steel industry (20 per cent), the glass industry (45 per cent), the fabrication of ferromanganese (30 per cent), and for all other uses (5 per cent). In that year, the year of greatest output, the production amounted to 1.476 tons valued at 96.000 pesos. It was mostly psilomelane, but some pyrolusite, with a content of 38 per cent M_n, was also produced. The total production for 1941 was an increase of 107 per cent over that of 1940. Manganese has been produced in Argentina on a very small scale ever since 1926, but the Nation only increased its production appreciably starting with the year 1941.[124]

Many deposits occur in an area 50 miles long and 20 miles wide extending in a north-south direction from Ambargasta, Province of Santiago del Estero, to Dean Funes, Province of Córdoba (Fig. 15). That area is underlain by older gneiss and schists and beds of sandstone and conglomerates of Paleozoic age. The manganese ore usually occurs in irregular masses and veins from 1 to 6 feet wide in bedded formations. All the deposits are surface-mined, the workings extending to a 50-foot depth.[125]

Estimates indicate results sufficient for the country's demands.[126]

The mine "Tres Lomitas," situated in Chuñahuasi, department of Sobremonte, in the Province of Córdoba was the major producer, furnishing 60 per cent of the Nation's manganese concentrates in 1941. The greatest

---

[123] Ibid.

[124] Estadística Minera de la Nación, 1941, op. cit., pp. 27-29, and Ibid., 1943, op. cit., p. 33.

[125] F, Minerals O., op. cit., p. 33.

[126] Catalano, op. cit., p. 174.

part of the mineral extracted was pyrolusite with 39 per cent M_n. The shipping point was Deán Funes, 83 kilometers distant, for all the manganese produced.[127]

Other mines in the same department, situated in Aguada del Monte, produced 360 tons of psilomelane with 35 to 40 per cent M_n, and a small part of pyrolusite, and used Lucio V. Mansilla and Candelaria Norte, some 80 kilometers distant as points of embarcation.

In the department of Ojo de Agua, Province of Santiago del Estero, there were two mines, "La Santiagueña" and "La Esperanza" that produced pyrolusite and some psilomelane, of 35 and 40 per cent M_n, that were shipped from Sumampa.

Beds also occur in the Provinces of San Juan, Tucumán, Mendoza, and in the Territories of Neuquén and Catamarca, but are unexploited largely because of the high transport costs from these inaccessible locations.[128]

As a consequence of the high costs of production and transport, no export of manganese ore has ever occurred. In 1941, however, there were 334 tons of manganese peroxide and borate imported from the United States and England.[129]

Tungsten (WO_3).-Tungsten deposits were known to exist in Argentina from the end of the last century, but the commercial exploitation dates from 1900 in response to external demands. Production figures from 1910 to 1943 show much fluctuation in the volume produced. There was a slight increase around 1917, and then a much larger increase starting in 1938. Argentina's tungsten concentrates have always been sold in foreign markets,

---

[127] Estadística Minera de la Nación, 1941. Suma, p. 28.

[128] Estadística Minera de la Nación, 1941. op. cit., p. 32.

[129] Ibid., 1941, p. 26.

and therefore, the output of tungsten ores has mirrored the world market prices. Most of the producing properties have no mechanical plants, thus there is little capital invested and it is easy to suspend operations when prices are low. The owners either lease their mines, or work them on a royalty basis. The miners, who are mostly local farmers, are paid per kilo of high grade concentrate produced.[130] Figure 16 shows the production, by tonnage and value, and exports of tungsten between the years 1936 and 1943.

There is only one company that in recent years has made capital expenditures in the reopening of tungsten mines and in the installations of mine and mill plants, the "Sociedad Minera Argentina, S.A."

Just before World War I there was a substantial output, which reached its maximum of 1.013 tons in 1917. After the War little tungsten was mined and none at all in 1933. Production was resumed in 1934 and has shown an appreciable increase each year since then. There were 1.564 tons of tungsten concentrates produced in 1941, of which the Province of San Luis produced 951 tons (more than 60 per cent of the total production), the Province of Córdoba 349 tons, the Province of San Juan 120 tons, the Province of Catamarca 102 tons, and 41 tons more were produced by the Provinces of Mendoza and La Rioja.[131] The average content of the wolframite was around 68.8 per cent (WO_3) and that of sheelite around 66.9 per cent (WO_3).[132]

San Luis-Córdoba tungsten fields.--The most important tungsten mines are in the Sierra San Luis and in the Sierra de Córdoba which form part

---

[130] Foreign Minerals Quarterly, op. cit., p. 25.

[131] Anuario Geográfico Argentino, 1941, and Suplemento, 1942, op. cit. pp. 291-2 and 122.

[132] Estadística Minera de la Nación, 1941, op. cit., p. 41.

of the Sierras Pampeanas (Fig. 15). These mines produced more than 80 per cent of the Nation's tungsten in 1941, and almost 90 per cent in 1943. The deposits consisted of granite masses forming the ridges and intruding the schists and gneiss bedded rocks. The productive tungsten veins generally strike east and west. They are at or near the granite contacts, and may be a mile or more in length and from a few inches to a few feet wide.[133] Sheelite and wolframite both occur in these veins, as do also small amounts of pyrite, chalcopyrite, zincblend, bismuthunite and molybdenite. The gangue minerals are usually quartz, mica, tourmaline and fluorite.

The mine "Los Condores" situated 5 kilometers south of the town of Concarán (75 miles north of Villa Mercedes on the main line to Buenos Aires), in the department of Chacabuco, Province of San Luís, produced most of the tungsten in 1941. In 1939 all the tungsten was produced by hand methods. Now, however, there has been built a mechanical concentrating plant of 170 tons daily capacity, with selective installations for flotation and electromagnetism. In 1941 there was obtained 250 tons of tungsten concentrates with 69.46 per cent tungsten trioxide (WO_3), 233 tons of sheelite with 66.31 per cent tungsten trioxide, and 5.36 per cent Bi, and 2 tons bismuthunite with 64 per cent Bi.[134]

Some of the tungsten minerals are found scattered, while others are in clusters, and even occasionally rich pockets are found irregularly distributed both horizontally and vertically in the veins. Both the cut-and-fill shrinkage and open-stope mining methods are used. The concentrates are trucked to Concarán for shipment.

---

[133] Foreign Minerals Quarterly, op. cit.

[134] Ibid., pp. 26-28, and Estadística Minera de la Nación, 1941, op. cit., p. 42.

The known ore reserves of this mine are believed to be sufficient for about three years at the present rate of mining. These reserves may be greatly increased by deeper exploitation. With an assured market at a fixed minimum price the owners of this mine would willingly push ahead developments and add to the present mill capacity and thus double present output.[135]

Other tungsten mines in the Province of San Luis were worked in the department of San Martín and produced sheelite and some wolframite. Concarán was also their station of embarcation. Still other mines were exploited in the zone of La Toma in the departments of Pringles, General S, Pedernera and Capital. These mines produced about equal amounts of sheelite and wolframite.[136]

There were two important producing regions in the Province of Córdoba: the series of mines in the west-central Córdoba in the department of San Alberto, San Javier and Minas which produced mostly sheelite, and those in the department of Calamuchita that produced chiefly wolframite. The points of embarcation for the ore were Almafuerte and Villa Dolores.

Catamarca-San-Juan-Mendoza-La Rioja tungsten fields.--The mine "San Antonio," in the department of Belén, was the chief producer in the provinces of Catamarca. It is situated 14 miles southwest of Londres. The area consists of schists intruded by granite which in turn are intruded by dikes and quartz veins. It is an old mine from which wolframite is extracted. Other smaller mines were in the department of Tinogasta, in the Sierras of the same name. The stations of Andalgalá and Tinogasta were points of embarcation.[137]

---

[135] Foreign Minerals Quarterly, op. cit., pp. 26-27.

[136] Estadística Minera de la Nación, 1941, op. cit., pp. 27, 42 and 43.

[137] Foreign Minerals Quarterly, op. cit., p. 30.

The production for the Province of San Juan for the year 1941 showed a 33 per cent increase over 1940 due exclusively to the more intensive utilization of the "Guardia Vieja" and "San Rafael" mines situated in the Arrequintín and Agua Negra ravines, department of Iglesia. San Juan was the shipping station.

The mine "Josefina," department of Tunuyán produced 36 tons of tungsten and is situated in the Province of Mendoza. The production was wolframite with 70 per cent tungsten trioxide.

The small explorations and exploitations carried out in earlier years were intensified all the more in 1941. The regions exploited were in the Sierras de Famatina in the locality of the town of the same name, and to the north of the Sierra de Velasco. Only 5 tons rewarded their efforts, however.[138]

Only very small quantities of tungsten concentrates have been sold in the domestic market. There were only 5 tons retained for home use in 1941 and 70 tons in 1943. Some pilot projects utilized that small amount for the fabrication of various compounds in 1943. The principal ore-buying firms in Argentina have offices in Buenos Aires, and some have agents in the mining districts who purchase the ore in small lots by the kilo.[139]

In 1941 there were 1.589 tons of tungsten concentrates exported valued at 8.621.963 pesos. Of that quantity, 911 tons went to the United States, 616 tons to Japan, and 62 tons to Germany. By 1943 the export tonnage had risen to 2.251 tons, all of which was sent to the United

---

[138] Estadística Minera de la Nación, 1941, op. cit., p. 46.

[139] Foreign Minerals Quarterly, op. cit., p. 30.

States.[140]

Vanadium (V).-Vanadium concentrates, produced exclusively by the Province of Mendoza in 1941 (Fig. 15) amounted to 191 tons valued at 90,000 pesos. The entire production went to Japan, along with stocks from 1939 making the total export to that country 379 tons.[141]

Vanadium had been exploited in the Province of Córdoba since 1932, but this has ceased. In 1939 production was initiated in Mendoza. It has been small, amounting only to 431 tons in 1939, 35 tons in 1940 and 191 tons in 1941.[142]

The mines "Santa Elena" and "La Imperial," both situated in the department of San Rafael (south of the city of Mendoza), were the sources of the vanadium.[143] The "Santa Elena," situated in the district of 25 de Mayo, is at an elevation of 6,000 feet, 60 kilometers from the railway station at Capitán Montoya. The vanadium veins occur in schists and are very irregular, from an inch to a foot or more wide, with occasional pockets of ore. One of these veins has been traced for more than 600 feet, and along its surface are contained: argillaceous material with limonite in which crystals of vanadinite occur along with argentiferous galena, some pyrolusite, malachite in a gangue of quartz.[144] The ore bodies in the San Rafael district are capable of further development when market prices warrant such activities.[145] These mines have been in

---

[140] Anuario del Comercio Exterior de la República Argentina, 1941, op. cit., p. 459, and Estadística Minera de la Nación, 1941, op. cit., p. 47.

[141] Estadística Minera de la Nación, 1941, op. cit., p. 46.

[142] Ibid., 1943, op. cit., pp. 57-58.

[143] Ibid., 1941, op. cit., p. 47.

[144] Foreign Minerals Quarterly, op. cit., p. 37.

[145] Estadística Minera de la Nación, 1941, op. cit., p. 47.

operation since 1939.[146]

By 1943 vanadium had been discovered in the Province of San Luis, 30 kilometers east of San Martín and 56 kilometers from Concarán.[147]

Vanadium has also been reported to be present in the petroleum residues of Argentina and to occur in the deposits of asphaltites in the form of rafaelite in the Territory of Neuquén.[148]

The old silver-lead mines in Córdoba, not worked since 1932, are all within a radius of 20 miles, and may be a future area of vanadium ore if economic methods of recovery can be employed.[149]

Though vanadium was not used by domestic industry in 1941, there existed the possibility of fabricating ferro-vanadium, and in the preparation of various compounds for the ceramic and glass industries. By 1943, however, the fabrication of ferrovanadium was a reality, as was the preparation of vanadium of ammonio for application in ceramics as yellow-orange coloring.

Catalano has estimated the vanadium reserves to be 1.000 tons.[150]

Molybdenum (M_o).--Molybdenum is produced in the Province of San Juan, department of Iglesia (Valle de Chita and other nearby places) at 4.200 meters elevation. A road connects the mines with the town of Iglesia, 43 kilometers distant. The concentrates average 51 per cent M_o. It is used in the domestic steel industry. No statistical data are on hand concerning the production, consumption, or exportation.[151]

---

[146] Ibid., 1943, op. cit., p. 57.

[147] Ibid.

[148] Foreign Minerals Quarterly, supra, p. 35.

[149] Estadística Minera de la Nación, 1943, supra, p. 58.

[150] Catalano, op. cit., p. 177.

[151] Estadística Minera de la Nación, 1943, op. cit., p. 34.

Copper (C_u).--Copper production in Argentina has a long history, but never attained any great importance. The total production from 1851 to 1900, inclusive, was only 18.981 short tons.[152]

Early attempts at mining copper were all unsuccessful. Operations began as early as 1860, at Capillitas in the Province of Catamarca near Andalgalá. The typical ores were pyrite, tetrahedrite, chalcopyrite, galena, rhodochrosite, and sphalerite, or in other words, they contained copper, lead, silver, gold, iron, manganese, zinc, and antimony, with only the first four named being recoverable. The mining properties were taken over in 1901 by the Carranza-Lafone Copper Smelting Corporation of London with a capital of £ 600.000. It constructed an aerial tramway 22 miles long to convey the ore to the smelting plants at the foot of the mountains (now dismantled), about 10 to 12 miles by road from Andalgalá. The ore was said to be of light quality and the geology, metamorphic rocks penetrated by andesitic boss, not unfavorable to the occurrence of ore bodies.[153]

Another early attempt to develop a copper deposit, made by the Famatina Development Company with a capital of £ 400.000, took place in the Province of La Rioja, near Famatina, at an altitude of 15.000 to 16.000 feet. The copper-bearing veins in that region contained gold and silver in a thick series of Paleozoic slates. A twenty-one and one-half-mile aerial tramway was built from the mine to the railroad which was at an elevation of 11.000 feet. That mine was completely shut down in 1927. The ore was similar in quality to that of the Cerro de Pasco mine in Peru. The veins, however, were narrow and the quality of not a high enough

---

[152]Bain, op. cit., pp. 196-200.

[153]Bain, op. cit., p. 197.

grade to overcome this limitation. Other delimiting factors were the high altitude, scarcity of wood and water, and housing problems.[154]

Another failure was that of the Concordia Company, Ltd. at "San Antonio de Los Cobres," in the Territory of Los Andes, that worked veins containing copper, lead, silver and zinc between 1899 and 1903.

In Córdoba at Calamuchita (60 miles southwest of the town of Córdoba) deposits of oxidized copper ores were mined unsuccessfully by the Rosario Company around 1900.

On the whole copper can be found in almost every province along the eastern Andes north of Mendoza. During the early years of the 20th century many attempts were made to work these deposits. All were unsuccessful due to the fact that although the ore was high-grade, it was recovered at a great cost because the veins were narrow, and also because the increase in world copper production has come chiefly from large-scale development of extensive low-grade deposits that can be worked cheaply. No known deposits in Argentina of that character have been discovered.[155]

With the higher market prices for copper, some of those abandoned mines may be reopened and operations renewed.[156]

The production of copper, including a small quantity of cement copper from the Province of Catamarca, increased appreciably from 1940 to 1941, amounting to 63¼ tons, valued at $2.000 pesos, in the latter year. The new interest in exploitation was due to abnormal circumstances caused by the War, especially the scarcity of imported copper metal and compounds.[157]

---

[154] Ibid., p. 199.

[155] Bain, op. cit., pp. 199-200.

[156] Foreign Minerals Quarterly, op. cit., p. 36.

[157] Estadística Minera de la Nación, 1941, op. cit., p. 19.

Mendoza-Neuquén copper fields.--Of the total quantity of copper concentrates produced by the Province of Mendoza in 1941 (Fig. 15) more than one-third came from the mines "Las Choicas," situated in the hill of the same name, in the district of Valle Hermoso, department of San Rafael (about 200 kilometers southwest of San Rafael), very close to the Chilean boundary, and without adequate access from the Argentina side, a circumstance that necessitated exporting said production to the neighboring country. This is believed to be the richest copper region in the Province with possibilities equal to those of the Chilean side of the Cordillera. The minerals extracted were chalcopyrite, or yellow copper, bornite and calcosina or (sulfuro de cobre) with an average content of 21.50 C_u and 55 g/t A_g. Other copper ore, malachite (5 to 10 per cent C_u) was extracted in the Santa Elena district in the department of Las Heras, whose shipping point was Capdevilla.[158]

Mendoza is said to be the richest Province in copper from the point of view of economic value. The probable copper reserves for the province as a whole were said to be no less than 500.000 tons.[159]

By the end of 1941 there was a beginning at the exploitation of alluvial beds of malachite (green copper carbonate) with an average of 8 to 15 per cent C_u, by the mine "El Porvenir," department of Las Lajas about 45 kilometers south of Plaza Huincul, in the Province of Neuquén (Fig. 15).

Catamarca-Jujuy copper fields.--There were produced in 1941 in the Province of Catamarca (Fig. 15) 22 tons of cement copper, averaging 70 to 75 per cent C_u, obtained by treating the waters rich in copper compounds coming from passages of the abandoned mine "Capillitas," situated in the

---

[158] Estadística Minera de la Nación, 1941, op. cit., p. 20.

[159] Catalano, op. cit., p. 172.

department of Andalgalá. The cement copper was derived from the mine water which was diverted through 2 canals, each about 500 feet long, in which the copper in solution deposited on scrap iron. In 1939, 14 tons were recovered with a 72 per cent copper content, and in 1941 the content was between 70 and 75 per cent copper.[160]

According to Catalano there are more than 20 veins in the Capillitas mine from which more than 200.000 tons of mine waste could be recovered with an average of 3 to 5 per cent fine copper, while in the mine close to Chile and Los Andes there is a probable existence of no less than 100.000 tons of fine copper.[161]

The 17 tons of copper produced by the Province of Jujuy came from the mining region about 30 kilometers east of Huacalera.

As to the uses of copper, the largest part of the production was destined for the home market for the fabrication of copper sulphate. The mineral was seldom used with respect to internal consumption of metal, alloys and copper compounds. The uncertain international situation encouraged some beginnings of fabrication of metallic copper, although on a small scale today.

The mineral exploited in 1943 was destined partly for the obtaining of metallic copper and the manufacture of copper sulphate, in plants situated in the Federal Capital.

There were no exports of copper concentrates during 1940 or 1941. A few kilos of copper ingots and bars were sent to Paraguay, small quantities of copper sheets and plates to Paraguay and Spain, and copper in other forms to Uruguay, Paraguay, Bolivia, and the United Kingdom. There were no

---

[160] Foreign Minerals Quarterly, op. cit., p. 36.

[161] Catalano, op. cit., p. 170.

imports of copper concentrates during 1941.[162]

According to Catalano the estimated copper reserves for the Nation were about 1.000.000 tons of fine copper. In addition to those already mentioned are: 50.000 tons for Córdoba, 200.000 tons for La Rioja, 50.000 tons for Salta, and 6.000 tons for Chubut. There are also positive evidence of copper in San Juan, San Luís, La Pampa, Los Andes, and in several of the other provinces that will require further study in economic geology.[163]

Other alloying materials produced in Argentina.--Several other alloying materials are present in Argentina in varying amounts, such as, columbium and tantalium, tin and zinc.

The production of columbium and tantalium[164] concentrates was 2.000 kilograms in 1941, 3.000 in 1942 and only 800 in 1943. The decrease from 1942 to 1943 was 73.33 per cent in quantity and 76.47 per cent in value.

The columbium and tantalium isomorphically mixed with niobate and tantalium of iron and manganese are found in masses of black color, with a specific weight of 7 and a hardness of 8, when pure. They are obtained as secondary products in the exploitation of the pegmatites (quartz, feldspar, fluorspar, berilium and mica). Their recovery was verified in lowest quantities and in accidental form in certain places, especially in the Sierras de Córdoba (Fig. 15), where they are encountered accompanied with radioactive minerals of uranium and at the same time with granite.

---

[162] Estadística Minera de la Nación, 1943, op. cit., p. 19.

[163] Catalano, op. cit.

[164] Estadística Minera de la Nación, Sunga, p. 22, and Los Yacimientos de Minerales y Rocas de Aplicación de la República Argentina, op. cit., pp. 54-55.

The average mineral content was estimated at 60 per cent, calculated in total oxides (Ta_2O_5 - Cb_2O_5), establishing its value according to the greater content of oxide of columbium and tantalium in the concentrates.

In 1943 there was a small export to the United States.

The producing regions in the Province of Córdoba were: the mine "Cañada de Alvarez," situated in the higher part of the Sierra de Comechingones, 15 kilometers northeast of Merlo, department of Calamuchita, at 2.150 meters; the mine, "La Chiquita," in Puerto del Hueco; and the mine "El Hueco," also in the Sierra de Comechingones. The production was not obtained directly, but as secondary material along with quartz, feldspar, fluorspar, berilium, and mica. In the Sierras of the Province of San Luis are deposits especially associated with cassiterite in the Sierra de Quines.

Tantalium is used in special steels, in the construction equipment for chemical plants, in technical illumination (electric bombs), and especially surgical instruments, and the only metal on which the weaving textures are developed. It is also useful in the fabrication of glass.

Columbium is used in special steels also, a percentage of 0.5 to 0.8 per cent increased its resistance to oxidation and hardness.

The production of tin concentrates in Argentina[165] has shown an appreciable rise from 1936 to 1938, the latter year being the one of maximum production, then a decline from 1938 to 1943. The production in 1936 was 1.440 tons worth 2.150.000 pesos, 2.385 tons valued at 3.970.000 pesos in 1938, the peak year for production, but only 1.170 tons in 1941 worth 2.500.000 pesos, and a further decline to 631 tons valued at

---

[165] Estadistica Minera de la Nación, 1941, op. cit., pp. 22-23, 25; Ibid., 1943, op. cit., pp. 26-28; Foreign Minerals Quarterly, op. cit., p. 20; and Anuario del Comercio Exterior de la República Argentina, 1941, op. cit., pp. 242-3 and 327-8.

1.767.000 pesos by 1943. From 1941 to 1943 the production was less than the consumption, the latter being about 1.100 tons annually. Export trade was prevented by a Decree of July 16, 1941 until the country was able to build up its reserves. There were no imports of tin concentrates in 1941, but a small import tonnage, some 20 tons, arrived in 1943. The situation as of 1941 was not encouraging for the decline in production from 1938 to 1943 was due to slow depletion of the easily workable placer deposits of cassiterite that have supplied almost all the Nation's tin. The solution to the problem lies either in the recovery of tin from the less accessible vein deposits at a greater expense, or in the import either of tin ore from Bolivia, or of metallic tin from other countries.

In 1941 the Province of Jujuy produced 1.161 tons of zinc concentrates and the Province of Catamarca furnished the remainder which was only 9 tons. All the production for that year went for the fabrication of tin ingots.

The placer deposits and veins of tin-silver ore in the adjacent canyon belonging to the "Sociedad Minera Pirquitas," in the department of Rinconada, 120 kilometers west of Abra Pampa, in the Province of Jujuy, have been the source of almost all the tin concentrates produced in Argentina (Fig. 15). Only a very small amount was produced in the Province of Catamarca, near Tres Picos, 15 miles east of Londres.

Deposits of tin are known to occur in the Province of La Rioja, but had not been exploited up to 1941 either because of lack of water or because the veins are too small for economic recovery.

The "Pirquitas Mine," 120 kilometers distant from the railway station of Abra Pampa is reached by a road. It is at an altitude of 13.500 feet with nearby mountains towering to more than 18.600 feet. The placer deposits in the valley have been worked since 1932, and as pointed out

above, began to give out in 1936. The tin-silver veins occur on both sides of the Picos Valley canyon at some two and one-half miles higher up, and have been worked since 1936.

It has been estimated that there is sufficient tonnage in the tailings for about 5 years.

The main placer deposits at Pirquitas extend along the valley floor over a length of 5,500 feet and a width of 1,600 feet. The minable tin gravels lie on top of red clay beds of Tertiary age. At the upper part of the valley, deposits 6 to 8 feet thick occur with an overburden of 20 to 25 feet, and in the lower part of the valley, the tin gravels are 1 to 2 feet thick with an overburden of 10 to 12 feet. To mine those alluvial deposits a central cut about 60 feet wide was made. Drag-line excavations with one-yard buckets removed the overburden and piled it along the side of the cut, while the gravels on the bedrock were shovelled away by hand into cars and hauled by diesel locomotives to the washing plant. Diagonal cuts, 50 feet wide, pointing upstream, were made from the main cut.

At the mill or washing plant, the gravel passed over grizzlys, the oversize went to the waste dump by way of belt conveyor, and undersize to a shaking screen with 1 inch and 5/8 inch screen. The oversize of 1 inch also went to the waste dump. The ore next went to the various jigs. The daily production was about 7 tons of jig and table product averaging 61 per cent tin content. From 1 to 2 kilograms of gold was also recovered.

The tin-silver veins occur in quartzite and schist of Cambrian-Silurian age. Overlying the older beds are a series of red and gray sandstones, conglomerates and clays of Tertiary age. The vein deposits are largely fillings along joint fractures and along fault planes formed after

the main folding of the strata. The tin ore is a light colored fine grain cassiterite in a gangue of quartz, pyrite, marcasite, glaena and sphalerite. The veins often show a banded structure, the cassiterite alternating with pyrite and quartz.

The main vein on the north side of the valley was developed by an adit 450 feet below its surface outcrop, and below this level the main ore-shoot is developed by a shaft to a lower depth.

In mining the shrinkage method was used and the ore was stoped about 3 feet in width. Some sorting of the rich ore was made at the stopes. The ore went by gasoline locomotive to the ore bins at the Tres Placa mill. At the mill the ore was sorted by grysslys and reduced by jaw crushers and rolls, and sized by vibrating screens. The daily capacity of the mill was 75 tons averaging 3.2 per cent tin and 3.25 kilos of silver p.t. The daily output was about 2 tons of concentrates which contained 41 per cent tin, 12 to 15 kilos of silver.

The flotation plant had a daily capacity of 60 tons. The tin recovery of this mill was about 35 per cent, which added to that of the Tres Placa plant made a total tin recovery of from 60 to 65 per cent.

The concentrates from the mine, some 300 tons monthly, go by truck to Abra Pampa, a distance of 80 miles, and from there, by way of railway to Buenos Aires.

The "Sociedad Minera Pirquitas" built a smelter in Buenos Aires in 1934 for the reduction of both placer tin and tin-silver concentrates. For the placer tin concentrates there were 6 small reverberatory oil-fired furnaces for charges of 2 tons each, 3 charges being made in 24 hours. Each charge consisted of 60 per cent concentrates, 15 per cent coke, 9 per cent iron, 6 per cent silica, and 5 per cent lime. The resulting metal products contained 97 to 98 per cent tin, and the slag contained

13 to 15 per cent tin, plus 15 ounces of silver per ton. The metal product went to refining pots where impurities were skimmed off and a product of 99.3 per cent tin was made. The metal was sold in Argentina, while the slag was exported.

The output in 1940 was 150 tons a month. Fuel oil consumption per ton of concentrate treated was about 300 kilos.

For the tin-silver concentrates, containing 15 to 20 per cent tin and 20 to 30 kilos of silver p.t., a chemical process was employed for separation purposes. The precipitate which resulted contained 40 per cent silver and went to a filter press to be packed in drums for export to the United States. The tin residue containing 20 per cent tin and 4 kilos of silver per ton was exported.

The tin-silver concentrates containing 40 per cent tin and 10 to 12 kilos of silver were treated by the same process. The residues containing 42 per cent tin and 4 kilos silver were exported to Europe and to the United States.

The annual consumption of about 1.100 tons was used in the manufacture of solder, type and bearing metal, tin tubes, and for other purposes.

There were no imports of tin concentrates in 1941. Tin in bars and ingots amounting to 1.037 tons came from the British Possessions in Asia, the United Kingdom and the Dutch East Indies, 7 tons of tin plates and sheets came from the United Kingdom and about one and one-half tons of chloride and sulphide and some 41 tons of tin oxide and compounds originated in the United Kingdom and in the United States.

Twenty tons of ingots, originating in Chile, Bolivia, United States and United Kingdom and 363 kilos of other zinc products (bronze, antifriction metal, British metal, pewter - an alloy of tin and lead, printing type, pure metallic tin, chloride, sulphide, oxide, and other compounds)

were imported in 1943. It was necessary, therefore, in that year to supplement the imports by recovering tin from the residues of new and used tin plates, and from tin slag. Even then, the national consumption was not met.

The total production of zinc concentrates in Argentina has been characterized by a marked increase from 5.467 tons valued at 200.000 pesos in 1936 to 66.384 tons worth 3.900.000 pesos in 1940, then by a recession from 1940. The production in 1941 had dropped to 66.016 tons valued at 2.950.000 pesos, and to 37.343 tons worth 2.311.400 pesos in 1943, the most recent year for which data are available (Fig. 17). The marked increase in 1940 was due to the sale of 100.000 tons of concentrates to the Metals Reserve Company of the United States. The decrease since 1940 has been due to the difficulties in the provisioning of fuels and material of transport.[166]

Practically all the zinc concentrates, corresponded to the blend, zinc sulphide (sulfuro de zinc), with an average content of 53.18 per cent Z_n, and were produced in the Aguilar mining district by the "Cia Minera Aguilar, S.A." situated in the department of Humahuaca in the Province of Jujuy (Fig. 15). Only a very small amount, some 6 tons, originated in the mine "Sol de Mayo" in the department of Pumahuasi, Jujuy. All the zinc ore was mined in association with lead and silver. The ore was treated in the concentration plant of the Aguilar mines and shipped from Tres Cruces, to Santa Fé if destined for export, or to Buenos Aires if for consumption in the domestic market.

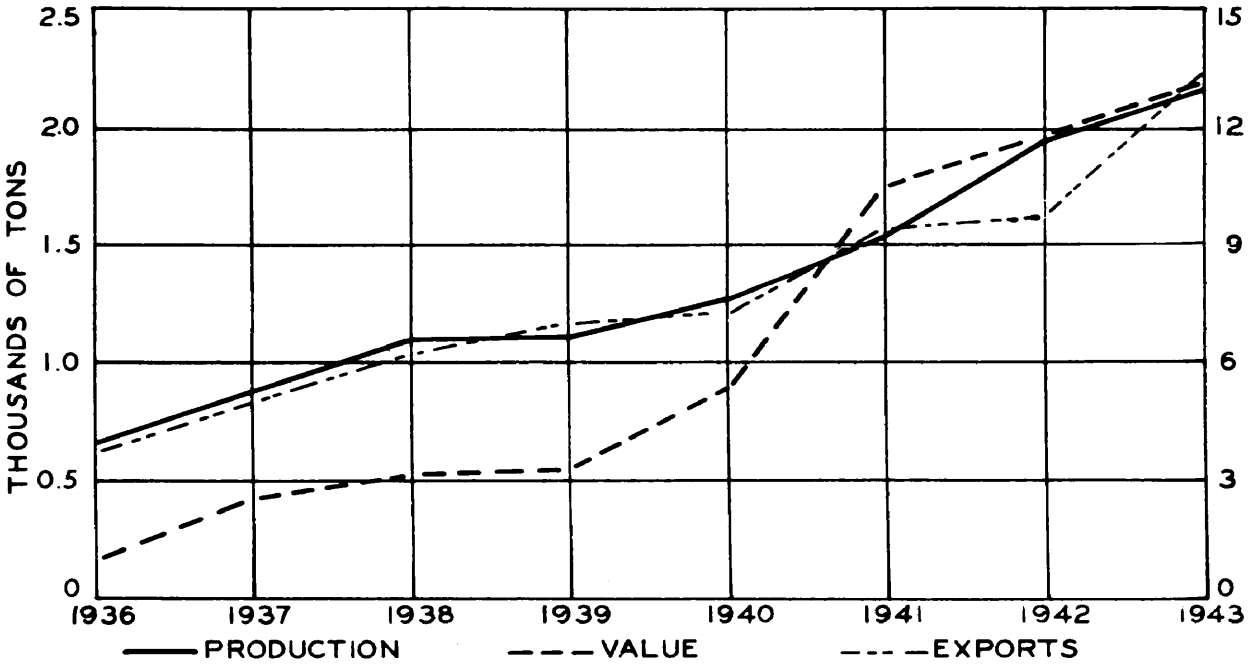
There was no zinc reduction plant in Argentina until the latter part

---

166 Estadística Minera de la Nación, 1941, op. cit., pp. 48-49; Ibid., 1943, op. cit., pp. 54, 55-56; Foreign Minerals Quarterly, op. cit., p. 13; Anuario del Comercio Exterior de la República Argentina, 1941, op. cit., pp. 459-460 and 492.

FIGURE 16

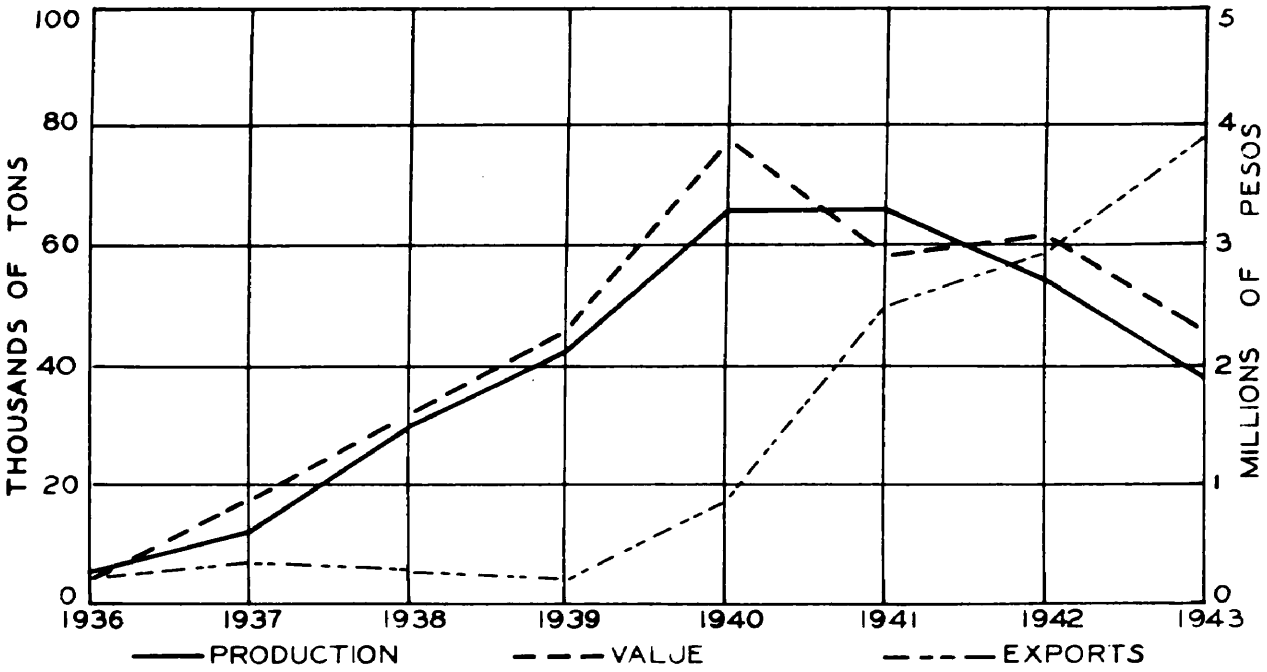
TUNGSTEN CONCENTRATES



ESTADÍSTICA MINERA DE LA NACIÓN, 1943, OP. CIT.

FIGURE 17

ZINC CONCENTRATES



ESTADÍSTICA MINERA DE LA NACIÓN, 1943, OP. CIT.

of 1942. The first plant for the fabrication of electrolytic zinc was built in the locality of Uriburu, in the Province of Buenos Aires. Its total production, using zinc concentrates from the Aguilar mines, was estimated at 1.513.400 pesos and was destined for internal consumption.

Another new plant was to be built in 1944 for the fabrication of metallic zinc by the retort method (procedimiento de retorta) and its estimated production was to be around 500 tons annually.

Consumption of zinc concentrates normally was 10.000 tons yearly, but rose to an estimated 11.500 tons by 1943. In 1941, aside from the internal consumption, all the mineral was destined for export. By 1943, moreover, 1.923 tons of zinc concentrates were destined for the elaboration of metallic zinc in the plant in Uriburu. Its production was contracted for before the needs of internal consumption, estimated at 11.500 tons, in which was included the metal necessary for the elaboration of zinc compounds.

That the figure for the export of zinc concentrates for the year 1941 is considerably more than that of the production figure for that year is undoubtedly due to the fact that the stockpiles in the country, which were estimated at 50.000 tons in 1940 were drawn upon to meet the increased demand of the war industries in the United States.

There was also a small export of metallic zinc products (ingots, bars, sheets, plates, salts and compounds) amounting to about 70 tons in 1941. These products went largely to Spain, Chile, very small quantities going to Paraguay, Greece and Finland.

Imports of metallic zinc (sheets, bars, plates, ingots) dropped from 9.531 tons in 1938 to 3.249 tons in 1941, and to 1.262 tons in 1943. Importation of chemical and pharmaceutical zinc products for industrial and medicinal use (zinc acetate, sulfate, oxides, chloride, salts, and

compounds) amounted to 5.925 tons in 1938, but dropped to 4.009 tons by 1941, and to 3.454 tons by 1943. These imports were supplied mostly by the United States, United Kingdom, Mexico, Chile and Peru.

Summary

One can not help but feel, after such an intimate study of the primary raw materials for iron and steel manufacturing, that any one of those mineral deposits (with perhaps the exception of petroleum) can be exploited only at a very great expense to the Argentine producer. One senses the peripheral location of the individual mines tucked away in remote valleys in the eastern flanks of the Cordillera de los Andes, or in the rugged hills of the Sierras de Córdoba, for which only a dirt road or trail serves as an outlet to the shipping point on some distant railroad. Freight rates on the long haul to the now-existing centers of industry are almost prohibitive. The lack of fuel in close association with the recoverable ore adds greatly to the problem of reducing the mineral to ore concentrates close to the mines. Up to the present time, there seems to be an absence of a mining population. Laborers must be recruited, in most cases, from nearby farms and grazing lands when the cost of producing a particular ore warrants activity in a given region. The non-periodicity of demand, even though these minerals are all considered to be critical minerals to the Nation's economy, has mirrored external influences, rather than a steady demand indicative of home needs. Even when the cost of certain of these minerals tripled during the last War, production went down rather than up in part because the mining economy was still in a state of imbalance. Costs of production have been inadvertently high.

The production of primary minerals for a basic iron and steel manufactural industry and of the minerals needed for the fabrication of alloy steels, by tonnage and value, in 1941 is given in Table XXVII.

TABLE XXVII

PRODUCTION OF MINERALS BASIC FOR IRON AND STEEL PRODUCTION, IN ARGENTINA, 1941*

Mineral	Tons	T. Pesos
Ferrous raw materials		
Iron ore	3.750	110
Refractory clays & flux		
Limestone	2.639.790	9.030
Dolomite	23.913	72
Fluorspar	2.027	120
Refractory clays	19.830	258
Alloying materials		
Chromium	60	15
Nickel (1)	400	1.600
Manganese	2.476	96
Vanadium	191	90
Tungsten	1.589	10.500
Molybdenum	(2)	(2)
Copper	634	42
Columbium	2	6
Tin	1.170	2.500
Zinc	66.016	2.950
GRAND TOTAL	2.760.648	27.389

*Estadística Minera de la Nación, 1941, op. cit.
Note: (1) data for 1940, (2) no data available.
Production is known to occur in the Province of San Juan.

Argentina's problem is by no means insolvable. Neither does the solution await the remote future. The country at the present time has abundant assets realized from War profits. These will be invested, and there is no better way, perhaps, than to suggest that they be spent in adding to the railroad net, building hydroelectric plants, carrying out further research pertaining to the utilization of the Nation's solid fuels for metallurgical purposes, surveying and mapping critical mineral resources in detail, and initiating metallurgical industries in propitious interior regions.

It would seem expedient to suggest that a basic iron and steel industry could be developed in the northwest, in the environs of the city of Jujuy, utilizing the hematite deposits and the petroleum and wood resources in that area (Figs. 10 and 15). The National Government turned out 20,000 tons of ingots from one furnace in 1946 at Zapla, Jujuy.[167] In the west-central region (Figs. 10 and 15), which is even closer to the Atlantic seacoast than the northwest region, there are present in the Province of Mendoza and the Territory of Neuquén deposits of iron ore, asphaltite, petroleum, and one of the largest potential waterpower sites in the entire country. This region is also conveniently located with respect to the matter of procuring ferrous raw materials and labor from Chile.

The civilized phase of the country is fully reached, when its people can rationally distribute all the resources contained in the subsoil.[168] This is the goal held before the Argentine industrialists at the present time.

The following interview[169] expresses the views of one Argentine concerning this problem.

---

[167] Rev. of the River Plate, op. cit. (July 5, 1946), p. 16.

[168] Catalano, op. cit., p. 43.

[169] Schuck, op. cit., pp. 70-71.

INTERVIEW
Granted to "Argentine Financial Service"
by Lieut. Col. Mariano Abarca

1. Do you consider that in normal times Argentina can produce coal for fuel and not only for the manufacturing of chemical products?

Ans. Both the State and a few private enterprises have, during the last years, only just begun important research work which tends to discover the amount of solid mineral fuels, there existing the impression that such fuel can be produced, though the production will be limited. The quantities will depend on the type and cost of transport and the possibilities of employing it near the ore fields.

2. Supposing the answer were affirmative what ore fields would produce such coal?

Ans. Although the possibilities of the Andean zone are not well known it can be foreseen that the fuel will be extracted from the different valleys along the Andes, where there are already important mining establishments.

3. Would you object to the participation of foreign firms in the production of coal and its subproducts?

Ans. Every country prefers to have the riches of its soil exploited by national enterprises, though this does not detract from the possibility of incorporating foreign capital into our industrial heritage, under certain conditions.

4. The actual production of iron is based on old iron. In a talk with officials which I had several years ago, I was told that steel production would be impossible in the interior of the country, due to the lack of coal, for the reduction of iron, and the inferior quality of the Argentine mines. The only solution would be the establishment of foundries near the rivers and carry there Brazilian mining products and a small percentage of Argentine ores, and besides, imported coal. Are these statements still valid considering the results of the recent mining investigations, and if so, what would be the solution?

Ans. Explorations for iron-minerals are being made, and important fields have been found in Jujuy, where the country's first siderurgical plant is being installed. This plant represents only a fraction of our iron requirements.

5. In one of your speeches you mentioned the possibility of bringing ore from other South American countries to Argentine metallurgical establishments. How would the transport problem be solved in this case?

Ans. Preferably navigation would be used, as it offers cheaper freights, and there are the systems of rivers, such as the Paraná,

Paraguay, etc., which can facilitate the interchange of minerals to be treated in zones where the market, labor and other factors make it economically possible.

6. Would the mining development render necessary an extension of the Argentine railway system? Is it right to suppose that the State will take charge of this task without giving any new concessions to private firms? Or, do you consider that private companies, with or without the participation of foreign interests, are desirable concessionaries, presuming that their capital were in Argentine money?

Ans. These branches will be, in general, of support, so they will not have the incentive of making money, which is an essential feature in a private enterprise; therefore it will fall upon the State to execute the plan of work, as it has done in the branch of the asphaltite zone in Mendoza, over a range of 200 kms.

The excerpts that follow from a dispatch from Buenos Aires by Bernard S. Redmont, staff correspondent of World Report portrays the intentions of the present Argentine Government concerning the establishment of a steel industry in the Nation.[170]

The Argentine Government, aided by United States technicians, plans to build a steel plant between Buenos Aires and Rosario whose eventual output is to be 1.000.000 tons of steel annually. It will not only produce the pig iron, but also steel blooms and ingots. It will have a complete rolling mill which will turn out sheets and sections.

A mixed corporation will own and operate the plant. Private steel companies in Argentina will furnish 10 per cent of the initial capital of $25.000.000, and the other 90 per cent will be furnished by the Office of Arms Production, of the Ministry of War. The latter will have full control over the plant.

Foreign sources of raw materials will be relied upon. Iron ore will be imported chiefly from Chile and Brazil. Coal will come in from the Union of South Africa, Chile and Peru, but the latter being of inferior grade will necessitate the importation of coal from the United States and

---

[170] "Argentina to Build Own Steel Industry," World Report Vol. 2, No. 3 (January 21, 1947), p. 7.

Europe. Costs are expected to be high because of the difficulty in obtaining the raw materials.

A ready market within the country will be awaiting the new plant. "Present requirements of the Argentine steel industry are 600.000 to 800.000 tons annually. About 150.000 tons are produced locally." In normal times the remainder comes from the Continent and the United States. Certain plants are planning to expand, and certain ancillary industries will be built to absorb the output from the Government's new plant. Among the new industries may be those able to build locomotives and equipment for power plants.

Prices will be those prevailing in the world market. The Government will grant the new plant a preferential rate of exchange and will admit its equipment and raw materials free of duty in order to offset the difference between production costs in Argentina and those abroad. A Government subsidy will make up the remaining difference between costs and selling prices.

Countries formerly furnishing tonnage steel and certain finished products to Argentina will lose their market, except for special tools and machinery not fabricated in the Argentine mills. Certain other countries will find in Argentina a new market, that is, if they have raw materials to sell.

CHAPTER IV

CONCLUSIONS

Modern nations, like individuals, have personalities that represent a life cycle. Nations pass through a youthful stage of economic development characterized largely by extractive industries, small, but growing populations and a large measure of economic dependence to a mature stage of economic growth recognized by diversified economies and higher standards of living, and finally, to an economic stage of old age best exemplified in the highly industrialized societies where wealth and its associated culture have accumulated, but in which manpower problems appear due to a declining population. In terms of years, some nations have passed through the cycle rapidly, while others have had prolonged youths.

Certain nations have had such a variety of human and natural resources in an optimum climatic area that the products of their labor have been many and readily sold in the markets of the world. Their economies have become widely diversified and their populations largely stratified. Other nations have possessed an abundance of only one or a few natural resources. The basis of their existence has been closely linked therewith, and has had a tendency to narrow their prospectus and to present complications in the procuring of the basic necessities of life, especially when outside forces tended to disrupt the sale of their product or products in the world markets. Their economies lacked diversity and there was a general absence of a middle class.

In the final analysis it is the people who lend character to a society. In no way can the human element be eliminated from a geographic situation. It is axiomatic that to diversify a nation's economy will increase employment

and raise the standard of living of the people. It follows, therefore, that when a nation is attempting a general "over-hauling" of its economy in order to achieve such an objective, it attracts attention and calls for moral understanding. Argentina is such a Nation.

The economy of Argentina for many years was characteristic of the youthful stage of the economic cycle. It was largely associated with the expertation of products of the soil to Europe and the purchase of goods from the European factories. It took two world crises, World War I and the ensuing depression, to arouse the Argentines to the fact that they must diversify their interests or see their nation be absorbed financially by outsiders. The Nation turned toward industrialization.

One who has habitually characterized the Argentine geography as being that of an agricultural-pastoral economy is disinclined to accept the actual truth that the Nation is merging into a twentieth-century industrial economy. Unquestionably, it is so. Chapter I presented data germane to this national tendency. The marked growth in manufacturing between 1935 and 1942, the trend toward heavy industries, the large concentration of the manufactural activity in the Central Agglomeration, and the greatest contribution to the national income in 1941 being derived from manufactural pursuits were discussed. Certain major geographic reasons accounting in part fof this trend toward industrialization were also presented, among these were: the precipitous decline in exports during the depression years resulting in a reduction of circulating media within the country; the inconveniences attended by the inability of the consumer, whether industrialist or otherwise, to procure those manufactured articles basic to their needs; a manufactural industry that was in the expansive phases of development, the products of which in the inter-war years were greatly in demand by the building and construction industries; and a revision of the customs

tariff upward, plus the inauguration of the system of exchange control since 1931 whereby trade, both as to country and commodity, could be channelled and rigidly controlled by the Government.

An evaluation of that phase of manufacturing considered basic and hence fundamental to progress along the lines of modern industrialisation was offered in Chapter II. The iron and steel industry of Argentina in 1941 was characterized as an expanding industry, when compared with the year 1937; as belonging to the secondary and tertiary stages of fabrication; of being highly concentrated in the Central Agglomeration, and more specifically in the Federal Capital; as showing a tendency toward concentration in large plants; of having its total value of production aggregated from products manufactured largely in foundries, rolling mills and one or two steel mills; and of dependence chiefly on ferrous scrap, fuel oil and charcoal of domestic origin and on foreign pig iron and ferrous semifinished products, coal and coke as industrial raw materials. Several major geographic factors conducive to this type of manufacturing were discussed, as for example, the availability of laborers due to the exodus of rural dwellers to the city; the shipping shortages during the last war that aided the "Buy Argentine" slogan; the comparatively low cost of importing pig iron and other ferrous raw materials, and metallurgical coal and coke through the utilization of water transportation; the accumulation of ferrous scrap in the country; and the opportunity of attempting to supply the expanding market in Latin America.

The next chapter, Chapter III, then made a geographic analysis, as scientific as was possible, of the fuel and power resources and the ferrous and alloying minerals available in Argentina, upon which the primary stage of iron and steel manufacturing and the manufacture of special steels might

be developed. The annual production of fuels were found to have still fallen short of meeting the growing domestic consumption of fuels in 1941 and the deficit had to be met by imports of fuel oil, coal and coke. The national production of fuels consisted mostly of petroleum from the Comodoro Rivadavia region, asphaltites from the Eastern Andean regions in Mendoza and Neuquén, and charcoal and wood largely from the Province of Santiago del Estero. The part played by residues in the "fuel picture" was carefully pointed out.

It was felt, after reviewing the location of the ferrous and alloying mineral resources in Argentina that costs of production are high due largely to the inadequacy of the now-existing transportation facilities, fuel and labor supply, and mining equipment. However, two regions seemed to hold potentialities for initiating a primary iron and steel industry, insofar as the location and what is believed to be true of the quality and reserves of those minerals is concerned, namely, the northwestern region in the environs of Southern Jujuy and the west-central region in Western Mendoza and Western Neuquén. In the northwestern region are to be found deposits of hematite (the reserves are said to be the largest in the Nation), limestone, copper, tin, zinc, petroleum, outcrops of coal, waterpower sites, and resources of wood for charcoal. There are present in the west-central region hematite, asphaltite (which has proven to be a basis of metallurgical coke), limestone, copper, tungsten, molybdenum, vanadium, fluorspar, and one of the largest potential waterpower sites in the country.

The general deduction was made that the inauguration of a primary iron and steel industry was a probability depending on certain recommendations which should be given careful consideration. These were: the extension of the present transportation net, a more detailed survey of the essential

ferrous resources, further research into the coking qualities of the asphaltites, the construction of hydroelectric plants and the decentralization of industry. Such improvements would increase employment, raise the purchasing power, expand the home market, and accelerate intra-regional as well as inter-regional trade. Also, it was recommended that the secondary and later stages of iron and steel manufacturing based on the utilization of ferrous scrap and the importation of those raw materials essential to the industry which could be procured through an economic basis of exchange with other countries should continue to be carried on in Greater Buenos Aires.

On the basis of the data set forth in this dissertation it would seem a bit unfair to suggest that the Argentine's delete all efforts toward further developing their iron and steel industry, either primary or secondary phases. One must be mindful of similar industrial situations within our own country when attempting to pass judgment concerning those of another nation. Our steel plants on the Atlantic littoral in the Baltimore-Philadelphia area are market-oriented, as are those in Buenos Aires, but must depend on foreign sources of ore. Coal, too, must be brought in from the interior of the country. Again, small steel plants have grown up in interior locations of our country that are far removed from the optimum manufactural region of the United States. In most cases these are raw-material oriented, either depending on local iron ore deposits or on scrap reserves. These plants are likened unto those capable of being developed in the peripheral regions of Argentina. It is unnecessary to make further analogies between the Argentine situation and other regions in the world. Suffice it is to say that many of the world's great industries have depended entirely on imported raw materials.

The general conclusion has been reached that a basic iron and steel industry in Argentina may prove to be successful, other things being equal, and the secondary and tertiary phases now in existence should continue to function.

To be scientific is to predict. What direction is Argentine industrialisation likely to take? And, why will it probably trend that way? These queries are correctly posed at this juncture.

The process of industrialisation is likely to continue steadily. This prediction is based on the kind of a world in which Argentina now finds itself. Up to the thirties, the Nation played an active part in the world order. Its growth was due mostly to the fact that the economy was moulded into the world framework because it was a contributor of foodstuffs and raw materials and a recipient of foreign manufactures and capital investments. The Nation's outlook in the next decade was completely altered. A strong nationalistic attitude manifesting itself in a trend toward a self-sufficient economy became apparent. That tendency was the result of changes taking place in the world economy. International exchange was disappearing and was being replaced in each country by economic nationalism. As a result, each nation wished to exclude foreign products. World War II has completely shattered the former world economic order. Nations today are hastening to orient export markets. In so doing they are encountering two disconcerting phenomena, the one, a starving people with little or no purchasing power, and the other, a generally high wall of protective tariffs. Post-war dumping is feared especially in those countries that are striving to rebuild war-torn industries and by those desiring to protect infant industries.. The inability of countries having money to spend, to procure the capital goods and other necessities they need adds a further dilemma to the development of a "One World."

Every right-minded world citizen should have faith in the successful outcome of the work of the United Nations organization. However, on the darker side, is the opinion of those who feel that the delay in formulating a plan for world peace and putting it into operation will further accentuate the development of nationalism and of economic blocs. This is the direction in which Argentina is going.

The Argentine Nation came out of the war years the wealthiest nation in Latin America. The major structural change that was evolving, from an agricultural-pastoral to an industrial economy, is now quite well crystallized. Stock raising has displaced agriculture to a certain extent, and crops raised for industrial purposes have increased at the expense of cereal gcrops. These changes are more or less temporary in view of the prices received in the world market at present. The Argentines do not perceive an immediate alteration in the present structure when they analyse world conditions. Should there ever come a time when the free-flow of world trade regains momentum, Argentine exports of agricultural and pastoral products may come to the forefront and once again replace the contribution of the output of industry to the national income. The Argentine industries, then, would be put to the test of proving their worth through competition in world markets. That possibility, to the Argentine, does not loom large on the horizon of the economic world order. The implications of their consensus of opinion is now being written on the pages of current history. They are losing little time in carrying out the role that seems to have befallen them in the post-war world, a role that is not entirely resultant from world conditions. By that is meant, that the normal economy of the Nation that would have evolved in a freely competitive world society has had a veneer of politicalism placed upon it....the keystone of which is

industrialism.

The following is an excerpt from President Perón's Speech to Congress, October 12, 1946:

> ....we want benefits to be distributed among fourteen million Argentines: we want the exploitation of wealth, bearing in mind that in our country, with almost three million square kilometers, only one million of them are exploited and of that million kilometers which is exploited, barely 25 per cent of its wealth is extracted. What problem can the country have in the economic field which we cannot solve by extracting more wealth from our land, which is still abandoned and uncultivated? Hence the watchword of our Plan is: produce more. The solution of the Argentine problem lies in increasing her production in the field of production itself, in the field of industrialization and even in that of commercialization.[1]

The Five-Year Plan (1947 to 1951) is tripartite in design.[2] Its provisions extend to all sectors of the national activity from three angles: 1.) Government of the State (political, public health, education, culture, judiciary and foreign policy), 2.) National Defense (army, navy, and air force), and 3.) National Economy (population, social welfare, fuel and power, public works, transport, production, commerce and finance).

The goal of the Government's Five-Year Plan by 1951 is for an increase of 43.3 per cent in the value created by industrial processing, 52.8 per cent in salaries and wages, 34.0 per cent in employed personnel, and 50.0 per cent in motive power installed.

The salient features of the plans for industry are: protection for national industry, promotion of new industrial enterprises, increase in the level of industrial profits, higher indexes of economic production, increase in the national income, higher standard of living, and greater degree of

---

[1] Rev. of the River Plate, CI, No. 2863 (October 25, 1946), p. 11.

[2] Ibid., op. cit. (November 1, 1946), pp. 10, 11, 14-17.

social well-being aimed at eliminating social discontent.

Industries to be protected or promoted are those which process Argentine raw materials (agricultural, pastoral, forestal, and mineral products) and meet the requirements of consumer demand; those which process materials largely or entirely imported, but which produce articles of absolute necessity for private consumption and for national defense (rubber and metals); new industries or plant enlargements which process Argentine materials for local consumption or for export; and finally, those which manufacture essential consumer goods or those necessary for national defense using some or all of imported raw materials.

The general measures for promoting these industries have to do with exemption from, or reduction of customs duties on essential imports (raw materials, machinery, spare parts, etc.); subsidies and exchange measures giving preference to raw materials and semi-processed goods; certain aspects of tax reduction, finance and credit; advancement along technological lines; and finally, preferential rates to be applied to exports on a graduated scale based on the degree of processing.

There are several economists and technicians, representing private interests in the United States, now in the employ of the Argentine Government. They will make surveys and analyses of suitable interior sites for location of factories, will draw up the necessary blueprints, will assist in the construction of the plants, and lastly, will arrange for the purchase of the equipment in the United States.

The President plans to develop eight general areas of industrial activity. Two large ones, to include war industries are to be in the Andean foothills, far west and southwest of Buenos Aires. Another is to be near the Brazilian border. A fourth development is to extend west and northwest of Buenos

Aires. The other four are to be developed along the Atlantic littoral from Buenos Aires to the Straits of Magellan.[3]

The staff of technicians will center their interest on public works and industrial development, and later, more experts will be added to the staff to study the petroleum and mining activities.

From a strictly economic point of view the Five-Year Plan has much that is commendable for the country. A diversified economy is a stable economy. Large-scale development schemes of transport, power, housing, sanitation and nutrition are indispensable as an economic stimulus to industrial expansion. If an increase of consumer goods logically follows, there should result a rising standard of living.

Argentina, as a member of the family of nations, has much to offer. In isolation it will be impoverished. The Nation's economy should be a flexible one, allowing the country to readily adapt itself to new world conditions.

In the economic field, Argentina has not embarked entirely upon courses designed to ensure economic isolation. To a certain extent the country is still linked to world markets. The tendency now is to purchase the more specialized manufactured products and certain essential industrial raw materials abroad.

In the long run, however, if world trade revives, the Argentine tariff would need revision downward, and perhaps then, certain manufactural industries, being unable to compete in the world markets, would pass out of existence. Nevertheless, if the country is able to build up industries based on the economic recovery of resources in the country or on the

---

[3] "U.S. Experts to Aid Argentina in the Drive to Develop Industry," World Report, Vol. 2, No. 6 (February 11, 1947), pp. 10-11.

economic procurement of resources from abroad, industries will be firmly established. And, if the old laws of trade still prevail, a new industrial nation should mean another market for the older industrialized countries since the maximum volume of trade has always been carried on between the largest of the world's industrial nations.

TABLE 1

SUMMARY OF MANUFACTURING IN ARGENTINA, BY INDUSTRIAL GROUPS, FOR EACH CENSUS YEAR*

Industrial Group	1935	1937	1939	1941	1942	1935	1937	1939	1941	1942
	Number of Establishments					Number of Employees				
Foodstuffs	3.363	3.568	3.089	4.448	4.536	105.119	118.430	126.592	151.264	163.322
Textiles & mfrs.	1.390	1.640	1.828	1.967	2.084	75.401	90.614	95.691	111.294	121.232
Machinery & vehicles	1.085	1.434	1.796	2.141	2.259	44.019	55.910	61.650	73.391	77.861
Metal mfrs.(exc.mach.)	1.060	1.273	1.417	1.511	1.526	37.557	47.869	51.983	62.252	65.559
Forest prod. & mfrs.	1.164	1.434	1.608	1.964	2.265	26.767	33.954	38.349	50.533	64.277
Chemicals & mfrs.	387	434	458	538	589	14.095	18.838	20.276	24.856	28.447
Printing and publ.	663	759	817	846	856	12.747	26.421	27.361	28.608	28.875
Leather & mfrs.	461	531	566	752	854	18.240	19.599	21.183	25.372	28.273
Ceramic products	561	738	816	934	974	14.438	20.004	23.365	28.185	32.251
Paper & mfrs.	163	192	216	250	287	7.053	9.308	10.035	12.686	14.070
Rubber mfrs.	32	42	43	56	53	3.538	6.031	6.854	9.051	6.229
Miscellaneous	767	884	999	1.278	1.372	35.214	43.363	50.654	65.554	73.106
Total	11.101	12.979	14.453	16.685	17.655	404.188	490.341	533.933	643.026	703.482
	Wages and Salaries (T. Pesos)					Raw Materials Used (T. Pesos)				
Foodstuffs	155.286	180.062	197.573	224.840	251.394	826.645	1.223.244	1.196.475	1.503.010	1.825.538
Textiles & mfrs.	99.135	127.570	137.579	161.056	193.962	322.072	384.054	412.605	569.700	745.394
Machinery & vehicles	80.314	102.143	115.125	131.930	146.463	96.962	182.819	200.808	181.890	192.281
Metal mfrs.(exc.Mach.)	48.579	66.545	76.138	88.357	98.175	100.257	156.848	183.268	249.272	282.621
Forest prod. & mfrs.	24.859	36.459	43.766	53.781	72.813	37.814	53.447	65.570	101.108	138.512
Chemicals & mfrs.	20.799	28.128	31.397	38.910	47.815	85.703	119.523	130.817	186.498	223.354
Printing & publ.	41.703	51.066	55.318	56.465	59.388	37.595	49.336	56.691	72.546	78.231
Leather & mfrs.	24.875	29.011	33.885	38.475	44.690	52.511	83.619	84.921	121.555	154.012
Ceramic products	16.756	25.086	31.296	37.899	46.432	18.262	29.911	39.351	49.135	64.918
Paper & mfrs.	8.030	10.282	12.227	16.205	19.667	18.263	28.524	35.676	61.599	89.447
Rubber mfrs.	5.175	6.836	8.666	10.974	10.107	15.360	27.683	31.098	48.741	46.182
Miscellaneous	49.114	62.241	75.285	92.044	102.022	29.081	41.154	45.735	72.419	94.717
Total	574.625	725.429	818.255	950.986	1.092.928	1.640.525	2.380.158	2.483.015	3.217.473	3.945.203
	Value of Production (T. Pesos)					Value Added by Manufacture (T. Pesos)				
Foodstuffs	1.155.951	1.573.267	1.573.587	1.930.603	2.329.525	303.695	320.118	343.359	377.885	440.212
Textiles & mfrs.	471.738	572.262	626.843	843.549	1.078.189	141.676	177.829	202.500	254.562	306.827
Machinery & vehicles	204.188	324.505	371.633	379.888	430.159	102.378	135.312	164.050	187.648	225.897
Metal mfrs.(exc.mach.)	178.269	267.145	306.292	405.370	458.463	72.889	103.056	115.115	143.119	158.705
Forest prod. & mfrs.	81.570	113.517	133.492	190.472	260.021	42.391	58.323	66.042	86.721	119.014
Chemicals & mfrs.	122.849	167.373	189.300	268.119	340.184	34.100	43.716	52.933	70.857	92.023
Printing & publ.	119.187	150.822	167.237	185.948	203.202	79.697	99.444	108.326	110.757	122.367
Leather & mfrs.	86.523	124.986	134.549	178.661	223.149	32.704	40.055	48.106	54.920	66.130
Ceramic products	65.222	90.988	108.751	141.085	182.902	36.523	45.566	50.728	61.514	77.967
Paper & mfrs.	32.792	47.849	59.129	97.710	139.199	11.996	15.898	19.258	29.635	42.077
Rubber mfrs.	25.519	40.531	46.960	69.088	69.149	9.061	11.379	14.165	17.304	19.929
Miscellaneous	85.938	121.759	140.655	183.203	258.574	51.322	74.146	87.428	100.554	151.926
Total	2.629.796	3.595.054	3.858.428	4.873.696	5.972.716	918.432	1.124.842	1.272.050	1.495.476	1.822.072

*Estadística Industrial de la República Argentina, año 1942, op. cit., pp. 29-32.

TABLE 2

PERCENTAGE DISTRIBUTION OF EMPLOYEES, VALUE OF PRODUCTION,
AND VALUE ADDED BY MANUFACTURE, IN ARGENTINA,
BY INDUSTRIAL GROUPS*
For Each Census Year

Industrial Group	1935	1937	1939	1941	1942	1935	1937	1939	1941	1942	1935	1937	1939	1941	1942
	Employees					Value of Production					Value Added by Mfr.				
Foodstuffs	26.0	24.2	23.5	23.5	23.2	43.9	43.8	40.8	39.6	39.0	33.1	28.5	27.0	25.3	24.2
Textiles & mfrs.	18.7	18.5	17.9	17.3	17.2	17.9	15.9	16.3	17.3	18.0	15.4	15.8	15.9	17.0	16.9
Machinery & vehicles	10.9	11.4	11.6	11.4	11.1	7.8	9.3	9.6	7.8	7.2	11.1	12.0	12.9	12.5	12.4
Metal mfrs.(exc.mach.)	9.3	9.7	9.8	9.7	9.3	6.8	7.5	7.9	8.3	7.7	7.9	9.1	9.0	9.6	8.8
Forest prod. & mfrs.	6.6	6.9	7.2	7.9	9.2	3.1	3.2	3.5	3.9	4.4	4.6	5.2	5.2	5.8	6.6
Chemicals & mfrs.	3.5	3.8	3.8	3.9	4.0	4.7	4.4	4.9	5.5	5.7	3.7	3.9	4.2	4.7	5.1
Printing & publ.	5.6	5.3	5.1	4.4	4.1	4.5	4.2	4.3	3.8	3.4	8.7	8.8	8.5	7.4	6.8
Leather & mfrs.	4.5	4.0	4.0	3.9	4.0	3.3	3.5	3.5	3.7	3.7	3.6	3.6	3.8	3.7	3.1
Ceramic products	3.6	4.1	4.5	4.4	4.6	2.5	2.6	2.8	2.9	3.1	4.0	4.1	4.0	4.1	4.3
Paper & mfrs.	1.7	1.9	1.9	2.0	2.0	1.2	1.1	1.5	2.0	2.3	1.3	1.4	1.5	2.0	2.3
Rubber mfrs.	0.9	1.4	1.3	1.4	0.9	1.0	1.1	1.2	1.4	1.2	1.0	1.0	1.1	1.2	1.1
Miscellaneous	8.7	8.8	9.4	10.2	10.4	3.3	3.4	3.7	3.8	4.3	5.6	6.6	6.9	6.7	8.4
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	100.0

*Estadística Industrial de la República Argentina, año 1942, op. cit.

TABLE 3

DISTRIBUTION OF THE NUMBER OF ESTABLISHMENTS, WAGE EARNERS, AND VALUE OF PRODUCTION, IN EACH CATEGORY OF PRODUCTION IN ARGENTINA, 1941, BY INDUSTRIAL GROUPS*

Industrial Group	To 25.000	25.001-50.000	50.001-100.000	100.001-250.000	250.001-500.000	500.001-1.000.000	More than 1.000.000	Total
	--Argentine Pesos--							
	Number of Establishments							
Foodstuffs	570	1.339	1.071	735	275	173	285	4.448
Textiles & mfrs.	343	314	322	439	219	164	166	1.967
Machinery & vehicles	700	520	387	308	119	57	50	2.141
Metal mfrs. (exc. mach.)	289	338	343	284	118	64	75	1.511
Forest prod. & mfrs.	641	520	374	286	90	37	16	1.964
Chemicals & mfrs.	31	60	108	121	92	58	68	538
Printing & publ.	236	192	181	134	43	34	26	846
Leather & mfrs.	101	143	185	164	87	40	32	752
Ceramic products	403	200	146	110	36	16	23	934
Paper & mfrs.	30	46	42	55	40	22	15	250
Rubber mfrs.	5	5	10	9	7	8	12	56
Miscellaneous	493	209	212	192	90	55	27	1.278
Total	3.642	3.886	3.381	2.837	1.216	728	795	16.685
	Number of Wage Earners							
Foodstuffs	3.599	9.837	12.072	13.098	7.808	9.724	78.596	134.794
Textiles & mfrs.	2.689	2.989	4.544	10.197	8.164	11.876	62.631	103.090
Machinery & vehicles	4.823	5.193	6.168	10.206	8.164	6.516	24.635	65.705
Metal mfrs.(exc.mach.)	1.993	3.309	5.796	8.278	7.024	6.038	24.346	56.784
Forest prod.& mfrs.	6.610	7.637	8.387	11.716	5.654	5.110	3.014	48.128
Chemicals & mfrs.	201	444	1.107	2.196	3.042	3.177	10.072	20.239
Printing & publ.	1.497	1.676	2.201	3.308	2.308	2.873	9.099	22.962
Leather & mfrs.	704	1.341	2.702	4.252	3.855	3.766	6.804	23.424
Ceramic products	2.685	2.223	2.649	3.599	2.906	2.274	10.052	26.573
Paper & mfrs.	307	652	793	1.914	2.464	2.080	3.663	11.873
Rubber mfrs.	45	84	206	357	541	1.336	5.897	8.466
Miscellaneous	10.640	2.943	6.419	11.509	9.134	8.565	10.663	60.173
Total	35.973	38.393	53.044	80.630	61.064	63.635	249.472	582.211
	Value of Production							
Foodstuffs	6.931	50.684	75.007	114.535	96.496	123.975	1.460.975	1.930.603
Textiles & mfrs.	5.299	11.455	23.740	71.542	75.753	112.662	543.098	843.549
Machinery & vehicles	10.697	13.637	27.381	49.371	41.087	39.038	193.677	379.888
Metals mfrs.(exc.mach.)	4.614	12.122	24.907	43.576	41.707	43.212	235.232	405.370
Forest prod.& mfrs.	9.979	18.864	26.776	43.856	31.777	24.704	34.516	190.472
Chemicals & mfrs.	504	2.246	8.846	19.766	32.388	40.987	164.182	268.119
Printing & publ.	3.816	7.145	13.072	21.237	14.968	22.590	103.120	185.948
Leather & mfrs.	1.566	5.186	13.298	26.381	29.262	28.360	74.608	178.661
Ceramic products	5.784	7.041	10.328	17.099	12.704	11.008	77.121	141.085
Paper & mfrs.	456	1.731	3.094	9.023	14.634	15.991	52.781	97.710
Rubber & mfrs.	96	168	793	1.483	2.490	5.689	58.369	69.088
Miscellaneous	5.119	7.543	15.049	30.812	30.934	37.261	56.485	183.203
Total	56.861	142.822	241.491	448.681	424.200	505.477	3.054.164	4.873.696

*Estadística Industrial de 1941, op. cit., pp. 130-133.

TABLE 4

EXTENT OF CONCENTRATION IN 14 INDUSTRIAL GROUPS, IN ARGENTINA, 1940*

Type of Industry and No. or Establishments	Per cent of Establ.	Workers & Employees		Value of Production T.Pesos	Value Added by Mfr.	
		Number	Per cent		T.Pesos	Per cent
Frigoríficos						
Total (19)	100	31.845	100	531.006	87.707	100
3 largest	16	14.997	47	260.962	38.508	44
10 largest	53	28.431	89	500.920	74.842	85
Flour mills						
Total (228)	100	6.755	100	179.310	17.606	100
3 largest	1	894	13	32.579	2.505	14
10 largest	5	1.840	27	62.506	5.293	30
Breweries						
Total (21)	100	5.191	100	37.646	22.388	100
3 largest	14	2.754	53	26.061	16.675	74
10 largest	48	4.319	83	34.393	21.040	94
Tobacco						
Total (141)	100	9.118	100	60.801	15.275	100
3 largest	2	1.739	19	24.767	6.188	41
10 largest	7	4.098	45	50.652	11.064	72
Textile mills						
Total (225)	100	39.521	100	186.560	70.008	100
3 largest	1	8.520	22	40.301	13.928	20
10 largest	4	17.239	44	81.137	29.005	41
Paper & carton						
Total (37)	100	4.684	100	48.723	12.458	100
3 largest	8	1.769	38	22.573	5.131	41
10 largest	27	3.034	65	36.929	8.975	72
Tanning materials						
Total (16)	100	1.870	100	17.355	3.936	100
3 largest	19	872	47	7.354	1.249	32
10 largest	63	1.695	91	14.689	3.124	79
Oil refineries						
Total (19)	100	3.914	100	175.565	27.516	100
3 largest	16	2.166	55	107.518	12.786	46
10 largest	53	3.555	91	165.802	25.590	93
Rubber mfr.						
Total (59)**	100	6.384	100	47.129	14.233	100
3 largest	5	2.096	30	26.922	6.669	47
10 largest	17	4.900	71	39.550	11.300	79
Cement						
Total (14)	100	3.822	100	36.746	13.105	100
3 largest	21	1.930	50	18.606	5.867	45
10 largest	71	3.484	91	35.041	12.573	96
Iron & steel						
Total (4.367)**	100	56.531	100	330.386	128.577	100
3 largest	0.07	4.734	8	30.981	14.954	12
10 largest	0.23	7.031	12	52.230	22.424	17
Oilfields						
Total (10)	100	8.152	100	56.986	55.658	100
3 largest	30	4.395	54	34.865	34.587	62
10 largest	100	8.152	100	56.986	55.658	100
Chemicals						
Total (1199)**	100	21.764	100	202.091	56.603	100
3 largest	0.25	1.547	7	19.320	7.387	13
10 largest	0.83	3.422	16	37.588	12.988	23
Electric Power						
Total	100	20.021	100	262.835	- -	100
3 largest	0.32	1.061	5	158.987	- -	60
10 largest	1	2.686	13	193.951	- -	74

*Armour Research Foundation, op. cit., p. 90.
**Data for 1939.

TABLE 5

ARGENTINE PRODUCTION, IMPORTATION AND EXPORTATION OF TYPICAL RAW MATERIALS IN 1939*

Commodity	Units	Production	Importation	Exportation	Total Available for Consumption	Value of Net Importation	Value of Net Exportation	% Total Consumption Produced
		No. Units	Net Units	Net Units	Net Units	T. Pesos	T. Pesos	%
Linseed	Tons	1.264.169		1.224.177	39.992		175.728	3.161
Maize	"	7.619.500		2.919.111	4.700.389		191.548	162
Wheat & flour (In wheat terminals)	"	6.938.330		3.461.976	3.476.354		238.568	200
Sugar	"	520.530		29.846	490.684		11.978	106
Cattle on hoof (vacunos)	Head	8.300.000		2.661.796	5.638.204		297.482	147
Cattle on hoof (bovinos)	"	10.700.000		4.519.205	6.180.795		33.188	173
Wool (reducida a sucial)	Tons	176.000		163.066	12.934		162.681	1.361
Milk & its products (In milk terminals	Liters	3.000.000		320.350	2.679.650		19.728	112
Cotton	Tons	72.546		19.340	53.206		10.189	136
Raw hides, cattle	T.Hides	10.427		8.204	2.223		98.901	469
Raw hides, sheep	"	7.603		5.603	2.000		8.870	380
Raw hides, goat	"	4.031		2.572	1.459		3.463	276
Coffee	Tons	0	25.060		25.060	23.625		0
Rubber	"	0	14.393		14.393	17.579		0
Tobacco	"	19.470	8.953		28.423	15.932		69
Coal	"	1.320	2.934.433		2.935.753	101.176		0
Petroleum	"	2.665.582	1.921.280		4.586.862	108.671		58
Iron & steel (not mach.)	"	45.438	690.207		735.645	169.147		6
Copper	"	402	11.358		11.760	17.090		3
Chemicals	T.Pesos	202.091			295.206	93.115		68
Wool, inc. plywood & veneer	"	12.103			89.613	73.220		14
Wood pulp, paper, cardboard, etc.	Tons	114.653	247.514		314.734	57.931		36

*Armour Research Foundation, op. cit., p. 17.

TABLE 6

DISTRIBUTION OF NUMBER OF ESTABLISHMENTS, NUMBER OF WORKERS, AND VALUE OF PRODUCTION, IN EACH SUBGROUP OF IRON AND STEEL MANUFACTURING IN ARGENTINA, 1941*

Subgroup	Up to 25.000 Pesos			From 25.001 to 100.000 Pesos			From 100.001 to 500.000 Pesos			More than 500.000 Pesos			Total for Republic		
	Esta.	Work.	Prod.	Esta.	Work.	Prod.	Esta.	Work.	Prod.	Esta.	Work.	Prod.	Esta.	Work.	Prod.
1.Iron & steel, smelted, rolled, & fabricated into finished prod.	10	64	176	50	847	3.122	40	2.031	9.167	26	12.624	86.970	126	15.566	99.435
2.Finished products of tin plate, esp. containers	29	190	403	41	568	2.303	42	1.405	10.216	35	5.627	66.008	147	7.790	78.930
3.Construction materials, doors, windows, etc.	93	633	1.572	142	1.673	6.951	46	1.274	8.215	7	1.721	8.650	288	5.301	25.388
4.Finished prod. or iron	27	227	352	66	1.150	3.844	53	2.350	12.404	5	623	4.032	151	4.350	20.632
5.Kitchen ranges & heating units	4	23	55	23	306	1.104	15	499	3.085	5	967	6.888	47	1.795	11.132
6.Galvanized iron, esp. sheets	-	-	-	2	27	**	-	-	-	6	327	9.868	8	354	9.868
7.Bolts, screws, rivets, & nails	-	-	-	4	63	213	6	183	2.047	6	430	7.282	16	676	9.542
8.Rural prod.wire mesh, vats, tanks, windmills	13	82	201	18	191	1.035	7	211	1.887	4	576	5.044	42	1.060	8.167
9.Safes & metal furniture	5	31	85	15	182	890	12	659	2.972	4	927	3.322	36	1.799	7.269
10.Iron & steel pipes, esp. cast iron	-	-	-	1	18	**	2	48	**	5	536	6.332	8	602	7.070(1)
11.Beds of iron & brass	8	52	145	25	222	1.441	21	456	5.273	2	152	**	56	882	6.859(1)
12.Hardware for doors, windows, furniture	6	38	109	17	290	926	15	708	2.695	3	600	2.568	41	1.636	6.298
13.Wire,esp. stranded & galvanized	-	-	-	2	50	141	8	82	1.693	2	218	**	12	350	3.827(1)
14.Platform & other scales	2	17	**	14	186	824	2	189	**	-	-	-	18	392	1.471(1)
15.Iron worked in various forms	5	31	50	3	26	326	1	13	-	-	-	-	9	70	376
GRAND TOTAL	202	1.388	3.148(2)	423	5.799	23.120(2)	270	10.108	59.654(2)	110	25.328	206.964(2)	1.005	42.623	296.364(3)

*Estadística Industrial de 1941, op. cit., pp. 95, 97 and 123. **No data furnished by establishments in this subgroup.

Note: The Total Value of Production for each industrial subcategory (last column) has been calculated by the Dirección General de Estadística y Censos de la Nación. (1) Apparently are estimates. (2) Sub-totals include only those industries submitting data. (3) Total Value of Production for the Iron and Steel Industry, therefore, is the grand total of each sub-total for each industry as furnished by the Dirección General de Estadística.

TABLE 7

SUMMARY OF IRON AND STEEL MANUFACTURING IN ARGENTINA, BY SUBGROUPS,
For the Year 1941*

Subgroup	No. of Establishments	No. of Workers	Primary Motors	Wages & Salaries	Raw Materials Used	Origin of Raw Materials		Fuels & Lubricants Used	Value of Production	Value Added by Manufacture	Status of Subgroup 1941/1937
						National	Foreign				
	No.	No.	h.p	Thousands of Pesos							
1.Iron & steel, smelted, rolled, & fabricated into finished prod.	126+	17.576+	1.698-	28.738+	46.957+	15.382+	31.575+	4.375+	99.435+	46.505+	E
2.Finished products of tin plate, esp. containers	147+	8.230+	276+	9.960+	61.342+	5.513+	55.829+	439+	78.930+	16.847+	EE
3.Construction materials, doors, windows, etc.	288-	5.702-	280+	7.416+	13.575+	3.935+	9.640+	133+	25.388+	11.442+	E
4.Finished prod. of iron	151+	4.676+	683+	5.139+	11.417+	3.856+	7.561+	568+	20.632+	8.365+	EE
5.Kitchen ranges & heating units	47+	2.030+	39-	3.222+	5.882+	2.595+	3.287+	91+	11.132+	5.092+	E
6.Galvanized iron, esp. sheets	8-	433-	...-	1.017-	8.504-	1.536+	6.968-	121+	9.868-	1.184-	D
7.Bolts, screws, rivets, & nails	16+	762+	421+	1.195+	6.494+	401+	6.093+	93+	9.542+	2.842+	EE
8.Rural prod.wire mesh, vats, tanks, windmills	42+	1.182-	1.261+	1.562+	5.173-	1.294-	3.879-	150+	8.167-	2.753+	S
9.Safes & metal furniture	36+	1.973+	12-	2.451+	3.721+	1.776+	1.945+	54+	7.269+	3.415+	E
10.Iron & steel pipes, esp. cast iron	8+	647+	...0	1.021+	4.777+	1.402+	3.375+	515+	7.070+	1.731+	E
11.Beds of iron & brass	56+	967+	140-	1.342-	4.673+	2.451	2.222+	68-	6.859-	2.074-	D
12.Hardware for doors, windows,furniture	41+	1.772+	287+	1.929+	3.220+	1.652+	1.568+	129+	6.298+	2.869+	EE
13.Wire, esp. stranded & galvanized	120	376+	881+	538+	2.540+	567+	1.973+	76+	3.827+	1.192+	E
14.Platform & other scales	18+	432+	30+	576+	600+	499+	101-	150	1.471+	842+	E
15.Iron worked in various forms	9-	78-	...-	109+	160+	57+	103+	2-	376+	208+	E
GRAND TOTAL	1.005+	48.836+	6.008+	66.265+	179.035+	42.916+	136.119+	6.829+	296.264+	107.361+	EE

*Estadística Industrial de 1941, op. cit., pp. 94-97.

Note: (+ , -) Increase or decrease 1941/1937; EE increase in all criteria; E increase in more than half of the criteria; S half increase and half decrease in criteria; D more than half of the criteria showed a decrease.

TABLE 8

ARGENTINE IMPORTS OF IRON AND ITS MANUFACTURES
For the Years 1937 to 1943*

Commodity Group	1937	1938	1939	1940	1941	1942	1943(1)
	Tariff Value						
INDUSTRIAL RAW MATERIALS							
Iron, unworked							
Scrap iron & steel	8.582	2.400	8.909	2.727	10.473	47.309	
Ingots for smelting	3.410.582	1.848.138	3.651.359	1.844.502	1.840.659	527.000(2)	
Ingots for rolling	37.727	8.650	15.295	(3)	(3)	(3)	
Products for rolling	87.702.468	54.949.657	56.541.574	49.557.051	24.102.577	9.247.859	
Iron worked in other forms	50.201.377	37.128.533	32.918.865	28.941.685	22.684.728	15.371.611	
Total	141.360.736	93.937.378	93.136.002	80.345.965	48.638.437	25.535.691	14.030.729
MANUFACTURED PRODUCTS							
Arms	196.676	239.328	150.850	94.255	96.915	32.385	
Kitchen articles	2.250.611	1.456.025	962.960	210.850	80.593	88.490	
Cutlery	4.393.647	3.841.002	2.837.944	2.834.694	1.301.538	853.953	
Hardware	2.515.611	1.884.500	1.399.479	539.432	351.777	302.853	
Tools	8.835.025	5.701.080	4.482.190	3.197.065	2.645.007	1.954.351	
Other articles of iron & steel	22.161.194	22.490.716	18.854.478	12.107.354	8.856.656	3.717.718	
Total	40.352.764	35.612.651	28.687.905	18.983.650	13.332.486	6.949.750	3.438.699
GRAND TOTAL	181.713.500	129.550.029	121.823.907	99.329.615	61.970.923	32.485.441	17.469.428

*Anuario del Comercio Exterior de la República Argentina, op. cit., 1938, pp. 237-269; 1940, pp. 225-253; 1942, pp. 247-269; and 1943, p. 68.

(1) Subgroup given only in "Real" value, not "tariff" value.
(2) Includes only iron ingots.
(3) No imports for those years.

TABLE 9

SUMMARY OF IRON AND STEEL TRADE OF ARGENTINA
For the Year 1941*

IMPORTS (Tariff Value)		EXPORTS (Market Value)	
COMMODITY GROUP	Pesos	COMMODITY GROUP	Pesos
Industrial raw materials		Industrial raw materials (pig iron, iron and steel, unworked)	96.961
Iron unworked (scrap, pig iron)	1.851.132		
Hot-rolled products (bars, plates, sheets, sections, etc.)	24.102.577	Iron worked in other forms (wire, bands, pipes, fishplates, bolts, nuts, screws, etc.)	607.447
Iron worked in advanced forms (wire, pipes, bolts, nuts, screws, etc.)	22.684.728		
Total	48.638.437	Various other articles of iron and steel (household articles, safes, beds, metal furniture, saws, doors, windows, tanks, etc.)	2.842.935
Manufactured products			
Fire arms	96.915		
Kitchen articles	80.593		
Cutlery	1.301.538		
Hardware	351.777		
Tools	2.645.007		
Other articles	8.856.658		
Total	13.332.486		
GRAND TOTAL	61.970.923	GRAND TOTAL	3.547.343
COUNTRY OF ORIGIN		COUNTRY OF DESTINATION	
United States	46.618.705	Bolivia	771.302
United Kingdom	6.983.470	Chile	649.403
Brazil	5.082.015	Paraguay	528.035
Sweden	1.483.323	Colombia	375.459
Japan	651.252	Uruguay	360.849
Canada	583.522	Peru	309.345
Switzerland	189.428	Brazil	167.233
Chile	107.879	United States	149.480
Spain	93.612	Ecuador	92.701
Portugal	68.216	Spain	40.514
Others	104.501	Others	103.002
GRAND TOTAL	61.970.923	GRAND TOTAL	3.547.343

*Anuario del Comercio Exterior de la República Argentina, 1941, op. cit., pp. 137, 157, 286-311 and 497-504.

TABLE 10

CONSUMPTION OF FUELS AND LUBRICANTS FOR MOTIVE FORCE AND OTHER USES (Except for Traction) IN ARGENTINE MANUFACTURAL INDUSTRIES, 1941*

Industrial Group	Fuel Oil	Gas Oil & Diesel Fuel Oil	Naptha & Kerosene	Coal	Coke	Fine Coal & Blacksmith Coal	Wood	Lubricants	Others
	Tons	Tons	Cub.Met.	Tons	Tons	Tons	Tons	T.Pesos	T.Pesos
Foodstuffs	206.395	25.683	1.578	83.318	8.152	946	499.466	1.884	4.912
Textiles & mfrs.	95.248	5.280	292	1.041	144	235	21.032	590	423
Machinery & vehicles	22.918	6.659	1.934	5.056	5.524	5.536	56.979	563	1.436
Metal mfrs. (exc. mach.)	40.626	8.201	1.473	3.392	15.843	3.814	12.603	364	1.438
Forest prod. & mfrs.	924	1.022	444	1.926	126	96	49.552	221	63
Chemicals & mfrs.	69.666	3.026	279	6.048	845	642	58.785	215	695
Printing & publ.	1.837	223	99	313	17	148	2.429	92	48
Leather & mfrs.	5.201	1.015	287	122	110	173	8.080	91	82
Ceramic products	284.696	14.705	438	12.245	19.913	10.818	145.918	594	1.191
Paper & mfrs.	37.034	1.799	124	922	59	140	6.423	135	405
Rubber mfrs.	15.517	360	63	144	24	22	2.214	46	84
Miscellaneous	63.347	7.579	1.247	13.212	656	750	19.253	407	542
Total	843.409	75.552	8.258	127.739	51.413	23.320	882.734	11.319	5.202

*Estadística Industrial de 1941, op. cit., p. 166.

TABLE 11

CONSUMPTION AND COSTS OF FUEL ON THE ARGENTINE RAILWAYS, 1938 to 1943*

Year	Petroleum		Coal		Wood		Total	
	T.Tons	T.Pesos	T.Tons	T.Pesos	T.Tons	T.Pesos	T.Tons	T.Pesos
1938	542	14.207	1.234	27.363	477	4.532	2.253	46.102
1939	588	14.527	1.133	24.170	584	5.537	2.305	44.234
1940	701	22.224	822	23.938	916	9.507	2.439	55.669
1941	768	30.851	613	23.111	1.720	19.467	3.101	73.429
1942	558	26.883	319	16.151	3.536	47.428	4.413	90.462
1943	469	40.727	270	19.972	4.475	67.888	5.214	128.587

*Review of the River Plate, op. cit., (September 22, 1944), p. 20.

Note: The extent to which the price of fuel has arisen is reflected to a certain degree in the statistics of railway fuel consumption and costs. The total costs are far in excess of the 25 per cent increase in consumption.

To this table it is necessary to add, to complete the picture, 65.000 tons of maize and oil-cake in 1942 (910.000 pesos) and 117.000 tons in 1943 (5.569.000 pesos).

SELECTED BIBLIOGRAPHY

Government Publications

Argentina

Ministerio de Agricultura de la Nación. Dirección de Minas y Geología. Contribucion al Conocimiento de la Minera y Geología del Noroeste Argentino. Boletín 53. Buenos Aires: 1943.

_____. Estadística de Petróleo de la República Argentina. Publications Nos. 119-129 (non-continuous). Buenos Aires: 1939 to 1944.

_____. Estadística Minera de la Nación. Publications Nos. 118 to 131 (non-continuous). Buenos Aires: 1939 to 1946.

_____. El Yacimiento de Magnetita de Hierro India y otros menores del Departamento San Rafael, Provincia de Mendoza. Boletín 52. Buenos Aires: 1942.

_____. Los Yacimientos de Minerales y Rocas de Aplicacion de la República Argentina. Boletín 50. Buenos Aires: 1941.

Ministerio de Hacienda. Comision Nacional del Censo Industrial. Censo Industrial de 1935. Buenos Aires: 1938.

Ministerio de Hacienda. Dirección General de Aduanas. Tarifa de Avalúos y Arancel de Importacion (edicion oficial). Buenos Aires: 1939.

Ministerio de Hacienda. Dirección General de Estadística y Censos de la Nación. Estadística Industrial de 1937. Buenos Aires: 1940.

_____. Estadística Industrial de 1939. Buenos Aires: 1942.

_____. Estadística Industrial de 1941. Buenos Aires: 1944.

_____. Estadística Industrial de la República Argentina. 1942 (mimeographed). Buenos Aires: 18 de Julio de 1945.

_____. Las Exportaciones en el año 1944, comparadas con las de 1943 (mimeographed). Buenos Aires: 20 de enero de 1945.

Ministerio de Hacienda. Dirección General de Estadística de la Nación. Anuario del Comercio Exterior de la República Argentina. Buenos Aires: 1910 to 1943.

_____. La Poblacion y el Movimiento Demografico de la República Argentina en los años 1941 y 1940. Informe No. 89. Buenos Aires: 1942.

Great Britain

Department of Overseas Trade. Report on Economic and Financial Conditions in the Argentine Republic. London: H.M.S.O. (Annual from 1919 to 1939, excepting 1932 and 1934).

United States

Bureau of Foreign and Domestic Commerce. "The Argentine Steel Industry and Trade." Trade Information Bulletin, No. 776, 1931.

_____. "Manufacturing Developments in Argentina." Trade Information Bulletin, No. 820, 1934.

Department of Interior. Bureau of Mines. "Mineral Resources, Production and Trade of Argentina." Foreign Minerals Quarterly, Vol. 3, No. 3 (July, 1940).

United States Tariff Commission. Economic Controls and Commercial Policy in Argentina, 1945.

_____. The Foreign Trade of Latin America. Part II Commercial Policies and Trade Relations of Individual Latin American Countries. Vol. I The South American Republics (revised), Report No. 146, Second Series, 1942. Section I "Argentina."

_____. Iron and Steel. Report No. 126, Second Series, 1938.

_____. Mining and Manufacturing Industry in Argentina, 1945.

_____. Trade Agreement Between United States and Argentina, 1942.

Other Documents

Banco Central de la República Argentina. Annual Reports, First to Tenth Financial Periods, Buenos Aires: 1936 to 1945.

_____. Suplemento Estadística de la Revista Económica. (Issued monthly since 1937.)

Instituto de Estudios Económicos del Transporte. Consumo Ferroviaria de Combustibles en 1942 y 1943 (mimeographed). Buenos Aires: 14 de Septiembre de 1944.

_____. El Consumo de Combustibles en la Argentina en los Ultimos 20 Años y Actuales Perspectivas. Buenos Aires: 27 de Junio de 1942.

Books

Abarca, Mariano. La Industrialización de la Argentina. Buenos Aires: 1944.

Anuario Estadistico Inter-americano. Edited by Raul C. Migone. Buenos Aires: 1940.

Bain, H. Foster and T. T. Read. Ores and Industry in South America. New York: Harper and Brothers, 1934.

Brunengo, Pedro. Energia Hidroelectrica. Buenos Aires: Comité Argentino de la Conferencia Mundial de la Energia, 1945.

Bunge, Alejandro E. Una Nueva Argentina. Buenos Aires: 1940.

Carter, William H. and R. E. Dodge. Economic Geography. New York: Doubleday, Doran and Company, 1939.

Catalano, Luciano R. Plan Argentino de Movilizacion Industrial. Buenos Aires: 1943.

Cristia, Pedro J. Argentina Economica e Industrial. Rosario: 1944.

Dorfman, Adolfo. Evolucion Industrial Argentina. Buenos Aires: 1942.

Dorfman, Adolfo and F. F. Sintes Olives. Consejo Permanente de Asociaciones Americanas de Comercio y Produccion. Encuesta Continental sobre Fomento y Coordinación de Industrias. (Anexo de la Circular Documental No. 3 de la Comision Ejecutiva sobre "Fomento y Coordinacion de Industrias.") Montevideo: 1944.

Exchange Control in Latin America. Chicago: First National Bank, Foreign Banking Department, February 1, 1941.

Francioni, Manuel J. and Emilio Llorens. Ritmo de la Economia Argentina en los Ultimos 30 Años. Buenos Aires: c. 1941.

Harris, Seymour. Economic Problems of Latin America. New York: McGraw-Hill Company, 1944.

Inter-American Development Commission. 1. Argentine Industry, 2. Present State of Argentine Agriculture, and 3. Hydroelectric Power in Argentina. (Translations from the Spanish originals). Reports Presented to the Conference of Commissions of Inter-American Development. Washington, D. C.: Inter-American Development Commission, c. 1945.

Llorens, Emilio (ed.). Anuario Geográfico Argentino, 1941. Buenos Aires: Comité Nacional de Geografia, 1942.

_____. Anuario Geográfico Argentino, Suplemento, 1942. Buenos Aires: Comité Nacional de Geografia, 1943.

Magnin, Jorge. Combustibles y Fuentes de Energía. Buenos Aires: 1944.

Mata, R. G. and E. Llorens. Argentina Economica. Buenos Aires: 1940.

Miller, Benjamin LeRoy and Joseph T. Singewald. Mineral Deposits of South America. New York: McGraw-Hill Company, 1919.

Newhall, B. Latin America As a Source of Strategic and Critical Materials. (Special Publication, Pan American Day, April 14, 1943.) Washington, D. C.: Pan American Union, 1943.

Niebuhr, Adolfo. La Electrificacion de los Territorios Nacionales de la República Argentina. Buenos Aires: Comité Argentino, Conferencia Mundial de la Energía, 1940.

Olson, Paul R., and C. A. Hickman. Pan American Economics. New York: J. Wiley and Sons, 1943.

Phelps, Vernon L. The International Economic Position of Argentina. Philadelphia: University of Pennsylvania Press, 1938.

Rippy, J. Fred. Latin America and the Industrial Age. New York: G. P. Putnam's Sons, 1944.

Salera, Virgil. Exchange Control and the Argentine Market. New York: Columbia University Press, 1941.

Schuck, Walter P. (ed.). Argentine Financial Service. Argentina at the Turn of 1940/1941: A Business Survey. Buenos Aires: 1941.

_____. Argentine Financial Service. Argentina at the Turn of 1944/1945: A Business Survey. Buenos Aires: 1945.

Soule, George H., David Efron and Norman T. Ness. Latin America in the Future World. New York: Farrar and Rinehart, 1945.

Technological and Economic Survey of Argentine Industries with Research Recommendations. Report to the Corporacion Para la Promoción del Intercambio, S. A., 1943. Chicago: Armour Research Foundation, 1943.

Weil, Felix. Argentine Riddle. New York: John Day Company, 1944.

Wythe, George. Industry in Latin America. New York: Columbia University Press, 1945.

Articles

Arciniegas, Germán. "Printed in America." Inter-American, IV, No. 11 (November, 1945).

"Argentina to Build Own Steel Industry." World Report, 2, No. 3 (January 21, 1947).

"Argentina's National Income." The Review of the River Plate, XCVII, No. 2764 (December 1, 1944).

"Argentina's New Order." Business Week, No. 886 (August 24, 1946).

"The Argentine Five-Year Plan: Fuel and Power." The Review of the River Plate, CI, No. 2866 (November 15, 1946).

"Argentine Petroleum Industry." The Review of the River Plate, CI, No. 2857 (September 13, 1946).

"Bankrupt Britain Feared Over Coal." New York Times (September 21, 1946).

"Britain's Coal Exports to Argentina." The Review of the River Plate, XCVII, No. 2758 (October 20, 1944).

"The British Coal Industry," Fortune, 34 (October, 1946).

Bunge, A. E. "Nature and Scope of the Argentine Economic Recovery, 1937." Revista de Economía Argentina, XIX, No. 230 (Agosto, 1937).

"El Coke Metalurgico y la Industria de Fundicion." (Artículo preparado por la Dirección de Siderurgia y Metalurgia.) Boletín de la Secretaria de Industria y Comercio, año 1, Núm. 1 (Octubre de 1944).

Davis, Kingsley and Ana Casis. "Urbanization in Latin America." The Milbank Memorial Fund Quarterly, XXIV, No. 2 (April, 1946).

de Nardo, J. B. "Generalidades con Relacion a la Siderurgia y Su Analysis desde el Punto de Vista Technologico." Boletín de la Secretaria de Industria y Comercio, año 1, Núm. iv (Enero de 1945).

Derfman, A. "Bases Para la Formación de una Industria Metalúrgica Pesada en América Latin Mediante la Complementación Regional." Accion Económica, año 11, No. 15 (Enero 29 de 1942).

Dye, A. W. and G. Wythe. "Manufacturing Progress in Argentina." Bulletin of the Pan American Union, 70 (August, 1936).

"The Electrification of Argentina: What the Country's Light and Power Needs May Be in 1955." The Review of the River Plate, XCVII, No. 2767 (December 22, 1944).

"The Five-Year Plan." The Review of the River Plate, CI, No. 2864 (November 1, 1946).

"Fuels and Sources of Power." The Review of the River Plate, XCVII, No. 2763 (November 24, 1944).

"Future Changes in the Economic and Financial Structure of Argentina." Bulletin of the Pan American Union (October, 1946).

Garimaldi, Eduardo A. "Valor Industrial del Hierro Viejo." Boletín de la Secretaria de Industria y Comercio, año 1, Núm. vi (Marzo de 1945).

Heymann, R. G. and F. T. D'Arcangelo. "Electrodos para hornos electricos destinados a la Industria Siderurgica." Boletin de la Secretaria de Industria y Comercio, año 1, Núm. v (Febrero de 1945).

"The Industrial Development of Argentina: Its Early Stages, Present Structure and Future Prospects." The Review of the River Plate, CI, No. 2847 (July 5, 1946).

"Locomotive Fuel." The Review of the River Plate, C, No. 2825 (February 1, 1946).

Phelps, D. M. "Industrial Expansion in Temperate South America." American Economic Review, 25, No. 2 (June, 1935).

Poole, John. "The War and the Argentine Railways." The Review of the River Plate, XCVII, No. 2768 (December 29, 1944).

"Population Prospects Half a Century Hence." The Review of the River Plate, XCVII, No. 2766 (December 15, 1944).

"Resumenes Estadisticos y Su Expresion Grafica: El Consumo de Combustibles en la Argentina." Revista de Economia Argentina, año xxvi, No. 302 (Agosto de 1943).

Romeo, Croce. "Minerales Argentinas Para la Industria de Guerra." Revista Geográfica Americana, año xi, xxii, Núm. 132 (Septiembre de 1944).

Sarrate, C. L. "La Argentina y la Industria Metalurgica." Mineria Boliviana, año 1, No. 9 (Agosto de 1944).

"Some Argentine Petroleum Developments in 1942." Bulletin of the Pan American Union, 77 (August, 1943).

"South America IV: Argentina." Fortune, 18, No. 1 (July, 1938).

"U. S. Experts to Aid Argentina in the Drive to Develop Industry." World Report, 2, No. 6 (February 11, 1947).

Wythe, G. "The New Industrialization in Latin America." Journal of Political Economy, 45, No. 2 (April, 1937).

Wythe, G. "Outlook for Latin American Industry." The Inter-American Quarterly, 2, No. 2 (April, 1940).

Maps

Map of the Americas. South America: Sheet South. New York: American Geographical Society, 1942. Scale 1:5,000,000.

Map of Hispanic America ("The Millionth Map"). New York: American Geographical Society. Scale 1:1,000,000.

Ministerio de Guerra. Mapa de la Republica Argentina. Compiled por el Instituto Geografico Militar, 1937. Buenos Aires: 1937. Scale 1:1,500,000.