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TOWARDS NEW FORMS OF ECONOMIC CO-OPERATION BETWEEN LATIN AMERICA AND JAPAN

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Note

Since the report "Towards new forms of economic co-operation between Latin America and Japan" was prepared and first published in November 1980, many a change has occurred in the world economy, afflicting national economies as well as affecting international economic relations. The developed economies were hard hit by the severe 1980-1982 recession, but its impact on the developing countries was incommensurate with their capacity to bear it, triggering the debt crisis that survived both the recession and the subsequent upsurge.

In the meantime certain shifts in the developed countries' patterns of production, consumption and employment began to reveal themselves as a consequence of the imposing scientific and technological revolution. While its long-standing effects are not fully evident as yet, some immediate outcomes have been manifest; the latest available statistics are consonant with these results.

In order to summarize the impact of the latest trends on the economic relations between Latin America and Japan and to briefly review Japanese- Latin American trade conditions in recent years, the Economic Commission for Latin America and the Caribbean has prepared an additional introduction for the second edition of this study.

Nevertheless, it should be mentioned that the report itself has not become outdated since its first publication, inasmuch as its conceptual framework as well as its assessments of the urgent problems and conclusions about forms and areas of co-operation are still valid and useful.

August 1986

Norberto González
Executive Secretary
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America and the Caribbean

INTRODUCTION TO THIS EDITION

RECENT TRENDS IN ECONOMIC RELATIONS BETWEEN LATIN AMERICA AND JAPAN

The trend towards increasing interdependence between different countries and regions of the world has recently been observed and examined by the economists of many schools and tendencies, on account of its growing impact on national economies as well as its short-term and long-term implications for business and economic policy decisions.

Being the second largest economy in the capitalist world, with a strong and fast growing external sector, Japan exerts increasing influence abroad, either through its dynamic trade flows or through financial and/or technological co-operation. Latin America is one of the areas understandably interested in promoting both trade and co-operation with Japan.

While economic relations between Latin America and Japan expanded rapidly during the 1960s and 1970s, there was growing understanding that the mere continuation of past trends could not guarantee the results expected for the future on both sides. Hence, mutual interest in new, more promising and stable forms of economic co-operation gradually took shape in joint research and projects.

During 1978-1980 two teams of researchers from the International Development Center of Japan (IDCJ) and from the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) analysed thoroughly certain development problems faced by Latin American countries and the extent to which co-operation between Latin America and Japan could be mutually beneficial in resolving them.

The IDCJ and ECLAC experts examined the present stage of the industrialization process in Latin American countries, using as analytical background the situation of the newly industrialized countries of Asia and Japanese historical experience in terms of development phases.

It was posited that the basic objective of socio-economic development in Latin America is essentially to achieve growth acceleration with more social equity in the future, since the previous impressive growth results have not been shared by the mass of the people.

The important relationship between technological innovation and institutional-organizational progress was a basic assumption in the discussion on ways of accelerating growth and of taking full advantage of international co-operation.

While certain specific aspects of Latin American development and co-operation with Japan are analysed in detail (industrial strategy, agriculture and its development, iron ore trade, maritime transport), one of the purposes (and of the merits) of this report is also to present the conceptual framework for further studies on Latin American-Japanese co-operation in these and other areas.

Since this report was prepared in 1978-1980, the latest statistics used are for 1978 and mostly for 1975-1977. Nevertheless, the study has not grown out of date because of its outdated statistics, since its conceptual framework as well as many conclusions about forms and areas of co-operation are still valid and useful.

The structure of landownership, production, employment, marketing and consumption in Latin American agriculture has not changed so significantly in recent years as to invalidate the experts' assessment of the main problems to be solved. The same can be said of approaches for increasing productivity, expanding output and attaining an equity goal in the future. It is still necessary to close the gap between technically potential yields and actual yields, to develop chemical and biological technology suitable to Latin American farmers and to improve infrastructure which raises the yields of farm land.

Latin America still needs economic, technical and financial international co-operation to increase its agricultural production and exports, and Japan can make a significant contribution to this end. In its Official Development Assistance programmes Japan gives priority to development of agricultural infrastructure such as irrigation and drainage, to experimental research on crop cultivation and its extension, to organization of farmers and improvement in the marketing of agricultural products and to promotion of agroindustry.

In order to support the Latin American countries' self-help efforts to step up food production, Japan has also taken budgetary measures such as the "Aid for Increased Food Production", providing in 1980-1983 grant aid to seven countries of Latin America for the purchase of fertilizers, agricultural chemicals and equipment necessary for raising food production levels.

The total amount of Japanese Official Development Assistance to Latin America and the Caribbean more than doubled between 1980 and 1983, climbing from US$ 118.5 to US$ 240.7 million, while the share of the region grew from 6% to 10%. However, Latin America is still a minor recipient of Japanese bilateral aid, about 70% of which is allocated, by and large reasonably, to Asia and 15% to Africa.

While the studies conducted by the IDCJ and ECLAC experts will be valid for a long time, because of the graduality of changes in Latin American agriculture and the uneven course of the region's industrialization, some new trends in the world economy that have appeared or consolidated in the 1980s are causing alterations, some radical, in the international division of labour and in the flows of trade and co-operation.

The debt crisis, which has shaken the very structures of the Latin American economies, was virtually unheard-of during 1978-1980. Aggravated by the severe 1980-1982 recession in the main capitalist centres, however, it retarded the development process and contributed considerably to the deterioration of income distribution in most Latin American countries. It was inevitable that the priorities in national economic policies would have to be changed, the external sector being one of those most affected.

As Latin American countries drastically reduced their imports in order to cope with foreign debt service, the rising trend of Japanese exports to Latin America observed up to 1981 was abruptly reversed. In only two years they fell to two-thirds of their 1981 yen value. This slump is partly explained by the inevitable contraction in purchases of durable consumer goods, but it also comprised the decline in Latin American imports of Japanese industrial, agricultural and other technology.

Despite growing Latin American exports to Japan, the latter still maintains a sizable surplus in its goods transactions with the region. Taking into account the large Japanese deficit with Brazil, Mexico and Chile, its surplus with most other Latin American countries has even increased since 1979.

While Japanese imports from Latin America increased by 73% between 1979 and 1984, this positive phenomenon was counterbalanced by the growing concentration of purchases in a few countries of origin. Brazil and Mexico accounted for 38% of Latin American exports to Japan in 1979 and for 59% in 1984. If to this is added the increase achieved by Chile and Venezuela, the rest of the Latin American countries did not expand their exports to Japan in these five years. As their imports from Japan almost doubled in the same period, their deficit rose from US$ 1.5 billion to US$ 4.5 billion.

Although the report recommended that "particular emphasis should be placed on efforts to narrow the trade imbalance between Latin American countries and Japan", in the succeeding five years the imbalances widened for most Latin American countries.

According to trade statistics, in 1984 as well as in 1980 Latin America was mainly a supplier of food, raw materials, fuels and primary metals to Japan, with manufactured goods still an insignificant proportion of the total (see table 1).

In the meantime, the proportion of manufactures in Japanese exports to the developing countries of America grew from 81% to 92%, and even more significant was the increasing share of machinery and transport equipment -64.5% and 81.1% respectively.

Undeniably such a structure of Japanese-Latin American trade reflects the different levels of development and some basic features of their economies, but it is still disquieting that the commodity trade pattern is getting not less but more backward.

Some recent statistics confirm that the Japanese economy is experiencing a radical change which is transforming the patterns of production, employment and consumption, personal as well as industrial.

The impact of the third industrial revolution on the Japanese economy is revealed in the rapid advance of the high technology industries within the whole manufacturing sector.

The leading growth of labour productivity in electrical machinery, precision instruments and other high-technology sectors compensates for its rather sluggish performance in the traditional manufacturing industries (see table 2), but the high-technology plants do not make as much use of raw materials as the smokestack plants, and relative as well as absolute consumption of many kinds of raw materials in Japanese economy is actually declining in spite of increasing industrial output (see table 3).

Table 1

JAPAN: IMPORTS FROM DEVELOPING COUNTRIES IN THE AMERICAS ACCORDING TO THE STANDARD INTERNATIONAL TRADE CLASSIFICATION

(Millions of dollars)

		1980 value	% of total	1984 value	% of total
0	Food	1 058.1	18.7	1 251.6	17.6
2	Raw materials, excluding fuels	2 164.4	38.3	1 939.5	27.3
3	Mineral fuels	952.8	16.8	2 009.0	28.2
67+ 68	Metals	974.0	17.2	1 163.9	16.4
5	Chemicals	158.9	2.8	295.1	4.1
6	Basic manufactures, excluding 67, 68 metals	97.2	1.7	112.9	1.6
7	Machinery, transport equipment	185.0	3.3	242.4	3.4
	from Panama	22.6		115.4	
8	Miscellaneous, manufactured goods	9.6	0.2	6.8	0.1
	Total	**5 656.8**	**100.0**	**7 112.4**	**100.0**
Note: all manufactures		450.8	8.0	657.2	9.2

Source: United Nations, *Commodity Trade Statistics*, 1980 and 1984; Japan, *Statistical Papers*, Vols. XXX and XXXIV.

Table 2

JAPAN: LABOUR PRODUCTIVITY, BY INDUSTRY

(Indexes: 1980 = 100)

Year	Total	Manufacturing	Iron and steel	Machinery[a]	Electrical machinery	Precision instruments
1979	94.1	94.1	96.3	91.1	88.0	80.9
1980	100.0	100.0	100.0	100.0	100.0	100.0
1981	102.4	102.4	96.8	101.7	110.3	109.5
1982	103.4	103.4	96.5	100.6	118.4	104.9
1983	108.1	108.1	97.5	101.9	136.2	114.4
1984	118.8	118.9	109.3	113.4	163.5	133.4
1985	123.8	123.9	114.1	120.3	180.1	156.2

Source: Statistics Bureau, Management and Co-ordination Agency, *Monthly Statistics of Japan*, May 1986, No. 299.

[a] Excluding electrical machinery.

Table 3

JAPAN: MANUFACTURING INDUSTRY

(Indexes of Industrial Production (IIP): 1980 = 100;
Indexes of Consumption of Raw Materials (ICRM): 1980 = 100;
Materials-Output Ratio (MOR) = ICRM : IIP)

Year	IIP	ICRM	MOR
1968	50.2	57.9	1.153
1969	58.4	67.6	1.158
1970	66.5	76.2	1.146
1971	68.3	76.2	1.116
1972	73.3	81.7	1.115
1973	84.4	95.2	1.128
1974	81.1	90.4	1.115
1975	72.1	80.2	1.112
1976	80.2	87.5	1.091
1977	83.5	89.8	1.075
1978	88.9	93.3	1.049
1979	95.5	99.9	1.046
1980	100.0	100.0	1.000
1981	101.0	94.8	0.939
1982	101.4	91.4	0.901
1983	104.9	92.2	0.879
1984	116.7	99.7	0.854
1985	122.1	101.3	0.830

Source: Statistics Bureau, Management and Co-ordination Agency, *Monthly Statistics of Japan*, April 1983, No. 262; May 1986, No. 299

While the downward trend in the materials-output ratio is not a new phenomenon by itself, its rate of change had been palpably more gradual before 1975 and had not been sufficient to cause any steady reduction in absolute consumption of raw materials over and above "normal" cyclical fluctuations.

However, after 1975 the decline in the materials-output ratio became more pronounced, owing to the faster introduction of new technologies, to the extensive application of new materials and to the shift in production and consumption patterns away from durable goods based on heavy use of metals and energy.

Such a steep decrease in the materials-output ratio as the past ten years have witnessed caused first a relative and then even an absolute reduction in the Japanese economy's consumption of raw materials. For instance, consumption of crude oil increased until 1974 (250.5 billion litres), then diminished, and recovered during the next five years, reaching 253.0 billion litres in 1979. Since then it has dwindled almost every year to a scant 181.0 billion litres in 1985. In comparison with 1979 (=100) the gross national product index was 126.5 in 1985, while crude oil consumption fell to 71.6.

If the impact of the energy crisis and oil substitution programmes after 1973 was partly responsible for the decline in crude oil consumption, in some other cases structural factors are more manifest. Thus, apparent consumption of crude steel reached its peak in 1973 with 94.4 million tons, contracted to 83.3 million tons in 1979, was hit by the severe recession in 1981-1983, and recovered to only 76.9 million tons in 1985, an increase of just 1.5% over the 1970 figure.

For some other basic inputs the same trend is more recent and somewhat less pronounced, but all the same apparent. Even although the strong economic growth in 1984 and 1985 (GNP rose by 5.1% and 4.6%, respectively) was accompanied by some absolute increase in the use of raw materials, this short-term recovery did not actually reverse the long-term trend.

The shift of industry away from the massive use of oil, steel and other traditional basic inputs is a very gradual and uneven process, subject to cyclical fluctuations and to conjunctural dynamics, but the impact of the third industrial revolution on production and consumption structure has already produced some long-standing effects which are partly positive and partly negative at the same time.

While the imposition of new patterns is economically progressive and creates more propitious conditions for a forthcoming deployment of the modern productive forces in the incipient long-wave economic cycle, the compelling requirements of a structural adjustment in production and employment make this a socially painful process.

Between 1975 and 1985 the labour force in Japan increased by 12%, but the increment in the number of employed was just 11%, and employment in manufacturing industries grew by only 8% (against the 63% of industrial production growth). Employment in agriculture and forestry went down 25%, and the number of totally unemployed soared by 56%.

Although the rates of unemployment and the number of unemployed in Japan are relatively low in comparison with those of the United States and Western Europe, unemployment has been steadily increasing since 1973, always being higher at each corresponding cyclical point in succession (comparing cycle peaks with peaks and troughs with troughs).

The restructuring of the manufacturing industry with impending contraction of some traditionally vital sectors will inevitably squeeze out the least competitive firms and plants. Generally speaking, those which have greater agility in applying new materials and technologies, those which have more skill in offering new products at short notice on the markets, and, most important of all, those which have major flexibility and superior capacity of adaptation to the constantly changing conditions of the national and international markets, have better chances of survival.

The structural adjustment of the Japanese economy is not painful for the Japanese alone. The decline in raw materials consumption is harmful to many of Japan's trade partners, and for them the trend is aggravated by the faster decrease in consumption of imported raw materials (see table 4).

When the report "Towards new forms of economic co-operation between Latin America and Japan" was prepared in 1978-1980, the evident slump in consumption of some basic inputs was generally considered to be a part of the

Table 4

JAPAN: CONSUMPTION OF DOMESTIC AND IMPORTED RAW MATERIALS

(Indexes: 1980 = 100)

	1979	1980	1981	1982	1983	1984	1985
Domestic	101.9	100.0	94.8	94.3	96.3	99.6	101.2
Imported	105.2	100.0	92.1	87.1	84.7	87.3	83.3

Source: Statistics Bureau, Management and Co-ordination Agency, *Monthly Statistics of Japan*, May 1986, No. 299.

usual downswing within the "normal" business cycle fluctuations, although it was partly attributed to the general economic stagnation produced by the oil crisis.

This consideration led many economists to project a recovery in raw materials consumption with the next upswing in the busisness cycle and to forecast eventual supply constraints in lieu of the existing oversupply. Such a prospect logically accentuated the growing Japanese demand for raw materials and its importance in the economic relations of Japan with developing countries.

This outlook prevailed in the preparation of the report, which argued that mineral imports were of vital importance for Japan and that trade in mineral resources formed one of the strongest ties between Japan and Latin America. Actually the report said that with the upsurge of resource nationalism, Japan should draw up mineral import policies that would enable developing countries to maximize the contribution of the mining sector to the development of their economies. Without a conscious effort in that direction Japan could not hope for stable mineral imports. In other words, the elements of economic co-operation had become necessary on top of the conventional commercial transactions between the Japanese demand industries and the resource-endowed countries.

The very idea of economic co-operation as an additional element bound to strengthen trade was based on the need to secure mineral imports, and the example was given of Japan's economic co-operation with the petroleum exporting countries in order to secure oil imports from them.

However, recent statistics show that the absolute decline in raw materials consumption was not due so much to a short-term cyclical downswing, but to the shift in production and consumption patterns within the new long-wave economic cycle. In Japan as well as in the United States and Western Europe the trend is towards diminishing use of the traditional basic inputs, while the developing countries increase their supplies to the markets in order to obtain currency for their debt payments.

As a matter of fact, the decreasing trend in basic inputs consumption does not imply that Japan's need for raw materials will disappear or that its imports of them will come to an end in the foreseeable future. The process is very gradual

and uneven, upswings and recoveries are sure to happen, eventual conjunctural shortages will occur on the way, and Japanese reliance on imported raw materials is bound to persist for a long time.

The above-mentioned trend merely lessens Japan's external vulnerability in a market inclined to oversupply of raw materials, and thus, from the point of view of economic co-operation, makes Japan objectively less interested in participating in the long-term projects for raw materials, mining and processing in the developing countries. Indirectly, it reduces incentives for the Japanese Government to promote economic co-operation with Latin American countries in order to secure basic inputs supplies, although this rationale, even if in a lesser degree, will remain at the basis of Japanese-Latin American co-operation in the field of natural resource development and trade.

Among the most relevant and useful pieces of research that form the study is the chapter on strategy for labour-absorbing and export-oriented industrialization in the semi-industrialized phase. It is even more true now than then that the rate of increase of industrial employment in Latin America is considerably lower than that of some semi-industrialized countries of Asia and the rate of underutilization of labour (open unemployment plus underemployment) is extremely high in the region.

The researchers emphasize the point that in Japan small and medium-sized enterprises have been able to co-exist and develop simultaneously with larger ones, absorbing a considerable proportion of workers, while in Latin American countries the participation of small and medium-scale enterprises in total employment in manufacturing industry is substantially lower, and in some of the main countries of the region, small and medium enterprises failed to increase the number of persons employed by them at the same rate as the larger enterprises.

Using Japan's experience as an analytical background is relevant in view of the fact that, in the shift from the semi-industrialized to the fully-industrialized phase, small and medium-scale enterprises in Japan made an important contribution to the employment of labour and export of manufactures because they were usually much more labour-intensive than larger ones and acquired high degree of competitiveness in the world market.

While small and medium-scale enterprises received reasonable amounts of financial support from the Japanese Government, in most Latin American countries they had limited access to resources such as domestic and external financing, foreign exchange, technical assistance and training of workers compared with larger enterprises.

In recent years many Latin American countries have introduced some changes in their economic policies in favour of small and medium-sized enterprises. However, in the prevailing conjuncture of persistent recession and high internal and external indebtedness the measures adopted have at best only alleviated the burden without providing the needed impetus to the development of small-scale enterprises.

August 1986

Preface

For more than a quarter of a century economic relations between Latin America and Japan have been expanding without any serious setbacks. In recent years, these relations have become even closer in various areas of interest to both sides. The mere continuation of past trends, however, may not guarantee the achievement of desirable objectives for the future of both sides, particularly in view of the recent problems the Latin American region has been facing both internally and externally. This Report attempts to clarify the nature of these problems with the aim of suggesting possibilities for establishing new forms of mutually beneficial economic co-operation between Latin America and Japan. Despite the great geographical distance between them, we believe Latin America is an important region for Japan, particularly in terms of its future development potential and the possible diversification of trade and other co-operative activities. Diversification of economic relations in terms of both countries (or regions) and products also seems an important policy objective for Latin America, which is attempting to reshape its economy in a form more open to the international market.

On the one hand, the new forms of co-operation should be sought in the light of adequate recognition of Latin American countries' aims in restructuring their economies for the future as well as of the problems originating from the past performance of their economic development. In this respect, at least two characteristics —the semi-industrialized phase they have largely attained and their rich natural resource endowments— have to be kept in mind. On the other hand, Japan's capacity for co-operation should be carefully identified with respect to i) specific areas of economic relations in the light of Japan's development experience and ii) the possibility of thereby bringing benefits to Japan, whose phase of full industrialization makes it increasingly vital for it to be able to count on diversified and reliable supplies of natural resources.

We do not merely wish to emphasize the complementary aspects of the future relationship envisaged between Latin America and Japan, but the contents of the Report seem to provide us with promising prospects for the promotion of economic co-operation in the future between both sides for three reasons: i) the study has been carried out jointly by expert teams selected by both sides, ii) the suggested possibilities of new forms and areas have been derived from careful scientific analysis spread over three years, and iii) the research has been conducted for selected specific important areas, rather than to superficially cover all aspects of the problem before us. The IDCJ is a private, non-profit institution and the views in the Report are stated in its own capacity.

Finally, we would like to express our sincere thanks for the efforts rendered by the members of both study teams, especially the team directors, Mr. Norberto González, Deputy Executive Secretary, 0, and Prof. Kazushi Ohkawa, Research and Training Director, IDCJ.

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November 1980

FOREWORD

The major areas for possible research within the general framework suggested by the broad study objectives mentioned in the Preface, are specifically manufacturing and trade, mining, food and agriculture, and ocean transportation, rather than all the areas at issue. The choice has been made after intensive and careful discussion. Technological innovation and improvements to institutional organization have been assumed to be the most important and pertinent aspects which are more or less common to all the research areas mentioned above. This constitutes the working hypothesis agreed upon at the outset of the study, in the sense that these innovations and improvements could be suitably implemented in order to meet requirements arising from the building-up of a new style of Latin American development in most of the important sectors of the economy, and Japan's co-operation in this area could be most effective in the light of its historical experience and the accumulated knowledge derived therefrom. This does not, however, signify the complete exclusion of major relevant aspects other than technological and institutional problems. The related aspects have also been analysed whenever necessary.

Because of the limitation of the research areas and the hypothesis adopted, a number of important aspects and problems have been left almost untouched, the most important being, among others, capital, financing and investment and related fields. We hope that these will be studied in the future. However, we are pleased to be able to say that on the whole the research has been carried out with reasonable success.

The Report incorporates the major results described in our previous Interim Reports, "Towards New Forms of Economic Co-operation of Japan with Latin America", IDCJ, 1978 and "New Development Strategy for Latin America and Possibilities of Japan's Co-operation", IDCJ, 1979, with the final achievements made during the last year of our Project.

It is made up of parts one and two. Chapters 1 and 2 of part one are intended to summarize all the research results of the individual chapters in part two, with the purpose of presenting the problem in general together with particularly relevant areas, focusing on the new industrialization process of Latin American countries (chapter 1) and of recommending ways of promoting new forms of economic co-operation between Latin America and Japan (chapter 2). To achieve conciseness of presentation in chapter 1, discussions on more general aspects of Latin American development problems has not been reproduced from the previous Interim Reports. When necessary, readers are requested to refer to these earlier reports.

We would like to acknowledge the extensive co-operation received from Prof. Akio Hosono in preparing the draft of part one, in particular, chapter 2. However, we take responsibility for these two chapters of part one. The individual chapters of part two written by the team members * of the project, in collaboration with ECLAC staff,** are also the result of our joint studies, but the authors of these chapters bear responsibility for them.

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November 1980

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Part One

Chapter 1

ASPECTS OF THE NEW INDUSTRIALIZATION PROCESS IN LATIN AMERICAN COUNTRIES: AN OVERALL VIEW

Introduction

Industrialization cannot be viewed as equivalent to modern economic growth or socioeconomic development in general. Development of other sectors of the economy such as the service industries and agriculture is also an indispensable component. This is the reason why achievement of more balanced growth between the various sectors of the economy has long been a problem for development strategy. Moreover, the appropriate pattern, speed and role of industrialization may differ considerably from one nation to another because of varying conditions such as the phase of development, the size of the country and the amount of its natural resource endowment, etc. In most cases, however, industrial growth is the driving force of overall economic development and is the most dynamic element in its mechanism. There is no doubt that this basic observation is valid for the Latin American countries. We have agreed that our research should be focused upon the new industrialization process of Latin American countries in order to provide general but "strategic" background knowledge for considering the possibilities of promoting economic co-operation between this region and Japan in the future. The purpose of this chapter is to describe the major research results in this context.

However, the focus adopted by this chapter does not necessarily imply that other aspects are of minor importance. As will be mentioned below, the Latin American countries appear to vary widely in terms of development phases, the size of countries, the degree of natural resource endowment, etc. These historical and typological difference between individual countries within the region are important and should not be ignored, in particular in searching for new forms of economic co-operation between the region and Japan. Nevertheless, it is our view that industrialization must be the most important key element of development of these countries and that a number of countries other than the NICs will take this path in the near future. In addition, Japan's experience can be usefully examined in relation to the NICs in this region and this is desirable to determine a firmly established analytical background in order to derive possibilities for promoting the economic co-operation of Latin American countries with Japan.

At the outset, three aspects of a conceptual and methodological nature need to be explained for the reasons stated above: first, that relating to the so-called NICs, or newly industrialized countries, second, that relating to Japanese historical experience in terms of development phases, and third, that relating to analytical comparison with Asian countries. The recent emergence of NICs has given rise to a new problem in the shape of the trade in manufactured goods, often calling for restructuring of international trade, as the recent expansion of exports of these goods from NICs to developed countries has been very rapid. Not only the traditional, labour-intensive manufactures such as textiles, shoes and leather products, but also some capital-intensive or technologically more sophisticated products such as steel and ships are concerned. The problem has often been viewed as being the result of specific industrial trade policies adopted by NICs in a fairly short-term context. The effects of some "specifics" cannot be denied. It is our view, however, that the phenomenon should rather be perceived as a "natural" corollary of the high rate of postwar industrial growth in the developing countries, supported by the comparatively high rate of economic growth of the developed countries up to the beginning of the 1970s. Viewed from such a longer-term and broader standpoint, it may be more appropriate to discuss the problem at issue in terms of the concept of the "semi-industrialized phase" which these countries have reached in their long-term process of development.

In terms of three broad groups, low income countries (LICs), semi-industrialized countries (SICs) and industrialized countries (ICs), we can observe important features which characterize the SICs. In recent years (1970-1977), their average annual rate of growth has been 6.5%, far greater than the 3.1% of the ICs or the 3.2% of LICs.

The share of the industrial sector (in this broad coverage) in the GDP of the SICs was as high as 40% on average in 1977 —the same share registered by the present ICs in 1960. Since then, however, the share of industry in the ICs has tended to decline, sinking to 37% in 1977 and resulting in a greater share for the services sector, which rose from 54% to 59%. Even such simple statistics are enough to illustrate the international significance of the SICs, and in particular their dynamic performance in comparison with the countries of the other two groups. The classic dichotomy of LDCs versus DCs no longer seems appropriate for discussing the worldwide development performance. It is our view that the SICs are countries which have achieved a real shift, from their initial phase of incipient industrialization to the phase of semi-industrialization.

Japan's history of economic development endorses the validity of this view. Japan was at the semi-industrialized phase until around the early 1960s, although there can be no doubt that it is now in the fully-industrialized phase. Starting from its very low Asian-type income level, after passing through its initial phase of industrialization which lasted until around the end of the First World War it arrived at the phase of semi-industrialization. Due to certain historical events, in particular the Second World War, this phase lasted until the early 1960s. Japan might be called a NIC because of its speedy expansion of exports of manufactures during this phase, especially in the postwar period —the same process as that of contemporary NICs. What may be derived from this observation is the recognition that these countries have already achieved a

shift from the initial phase to the second phase, which is, so to speak, a transition towards another shift to the third phase of full industrialization. Again there is no reason why the Latin American countries should be any exception with respect to such a long-term historical progression of industrialization phases, although a number of countries in this region are still at the initial phase and the conditions and factors are often different from those of Japan, as will be discussed later. In elucidating the characteristics of Latin America in the discussions that follow, a comparison will often be made with Asia, and particularly the East Asian countries. We believe this is desirable and useful for two reasons: first, it is useful for clarifying both the common and different characteristics of industrialization generally found within the two groups of countries and second, since Japan belongs to Asia and particularly to the East Asian region, the development performance of the countries in this region has been influenced by Japan and this is of special concern to Latin America.

A. PATTERNS OF OVERALL GROWTH AND INDUSTRIALIZATION IN LATIN AMERICA

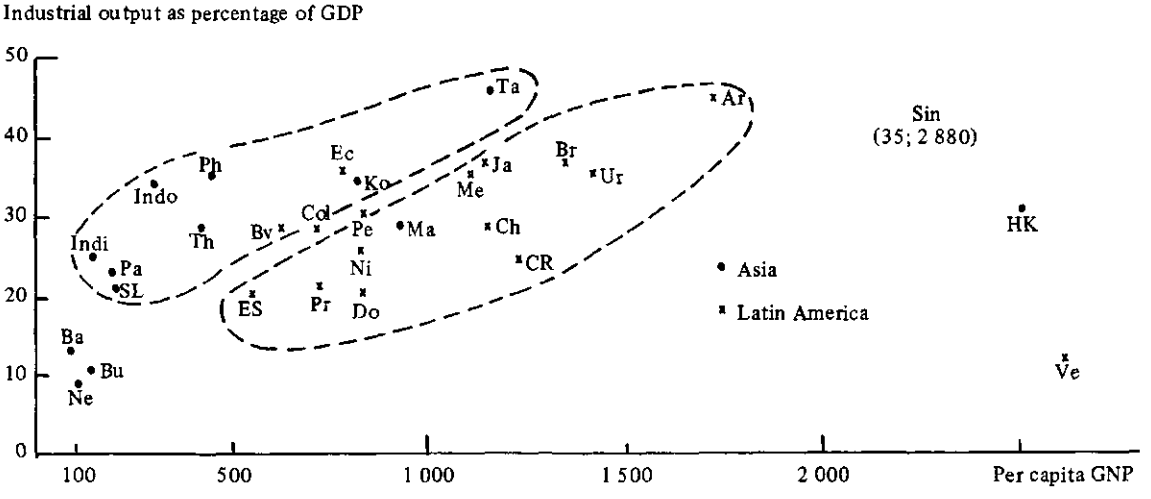
During the past quarter of a century, Latin America, as a whole, has shown an impressive rate of economic growth despite its very high rate of population growth: per capita GNP increased at an annual rate of 2.6% over the period 1950-1975, and the trend shows an acceleration, from 2.1% in 1950-1960 to 2.5% in 1960-1970, and 3.7% in 1970-1975.[1] The rate of increase of per capita GNP is higher than Japan experienced in the generally comparable development phase (1.8% in 1887-1919, 2.1% in 1919-1938), which is one of the highest recorded by today's industrialized countries, although it is surpassed to some extent by the postwar records of some other Asian countries. The per capita income level of Latin America, however, is much higher than that of East and Southeast Asian countries, and though the gap has been narrowed, it still remains wide (3.8:1 in 1950 to 2.7:1 in 1975). This does not indicate a difference in development phases, but is caused mainly by a wide difference of man-land ratio —an indicator of the difference in the natural resources of the two regions.

As this latter feature is important for the discussion that follows, figure 1 is presented in order to clarify the relationship between the rate of industrialization (indicated by the percentage share of manufacturing in the GDP) and the income level (indicated by per capita GNP in US dollars). In the comparison between Latin America and the Asian countries, the rate of industrialization appears rather similar on the whole, despite distinct differences of income level. A broad association between the rate of industrialization and income level can only be observed among individual countries in each region. We hope that figure 1 will also serve to bring out the wide variation in the rate of industrialization among Latin American countries, ranging from 13% for Bolivia to 37% for Argentina.

The picture is quite different when we look at the growth pattern. A fairly close association is found for the countries as a whole between the rates of industrial growth, as measured by manufacturing output, and those of overall

Figure 1

LATIN AMERICAN AND ASIAN COUNTRIES: RELATION BETWEEN SHARE OF MANUFACTURING IN GDP AND PER CAPITA INCOME LEVELS, 1977



Afg	Afghanistan	Gua	Guatemala	Ni	Nicaragua
Ar	Argentina	Hi	Haiti	Pa	Pakistan
Ba	Bangladesh	HK	Hong Kong	Pe	Peru
Br	Brazil	Ho	Honduras	Ph	Philippines
Bu	Burma	Indi	India	Pr	Paraguay
Bv	Bolivia	Indo	Indonesia	Sin	Singapore
Ch	Chile	Ja	Jamaica	SL	Sri Lanka
Col	Colombia	Ko	Korea	Ta	Taiwan
CR	Costa Rica	Ma	Malaysia	Th	Thailand
Do	Dominican Republic	Me	Mexico	Ur	Uruguay
Ec	Ecuador	Ne	Nepal	Ve	Venezuela
ES	El Salvador				

growth, as measured by GDP, almost irrespective of whether they are in Latin America or Asia (see figure 2). This implies two points which are worth noting: first, with respect to growth performance, common characteristics can be seen in the role broadly played by industrialization, despite the differences of income level and industrial structure at present attained by countries and the regional averages, and second, in Latin America in particular, the dynamism of industrialization in recent decades varies a great deal within the semi-industrialized countries and a wide range is noted, from the least dynamic cases of Argentina and Uruguay to the most dynamic cases of Brazil and Mexico. In fact, in the mid-1950s Argentina was the most industrialized country in this region, with a manufacturing output share of already 30%, followed by Uruguay, Mexico, Chile and Paraguay with shares ranging from 18 to 20%. All the other Latin American countries were still at a very early phase of initial industrialization, with shares of under 15% except for Colombia and Peru. The picture presented by the region has changed a great deal, however, during the quarter century of postwar industrialization, due to the varying degrees of dynamism between countries.

Several features of economic growth and industrialization may be observed in addition to the output production performance discussed above. Two of these are dealt with below, namely the aspect of resource allocation, centering on savings and investment, and that of international trade. Other aspects are left for discussion in the sections that follow. Figure 3 shows the relation between the ratio of gross domestic savings to GDP and the per capita income level. In this respect, the following points may be noted: i) Almost no association between the two is observed between the Latin American countries as a whole and the Asian countries as a whole. ii) For the Asian countries, a positive association between the two cannot be denied, while for Latin American countries this is not the case, higher income levels being sometimes even found for lower rates of saving. Comparison of an international cross-section of savings ratios in general does not confirm the expectations which might arise from the conventional notion of the savings-income relationship, so that these findings may not be interpreted as an unusual phenomenon, although their analysis is beyond our present purpose. iii) What concerns us here is the fact that Latin American countries on average tend to have rather low savings ratios despite their higher income levels in comparison with Asian countries, and this difference appears to be especially marked in the comparisons between SICs in the two regions.

The characteristics of Latin American countries in this respect seem to be broadly consistent with what has previously been identified in connection with their growth aspects. The higher level of income prevalent in this region may not be a relevant factor in shaping the growth pattern and identifying development phases. Thus, we should rather direct our attention to the initial historical and typological conditions, which differ between these two regions.

The balance between domestic savings and gross domestic investment is largely negative for most LDCs and this is often more serious for SICs, although the degree varies considerably among these countries. Comparing the investment patterns of Latin American and East Asian SICs, however, a most notable difference is found: a distinct pattern of what we call "investment spurt"

Figure 2

LATIN AMERICAN AND ASIAN COUNTRIES: RELATION BETWEEN GROWTH RATES OF MANUFACTURING OUTPUT AND GROWTH RATES OF GDP, 1970-1977

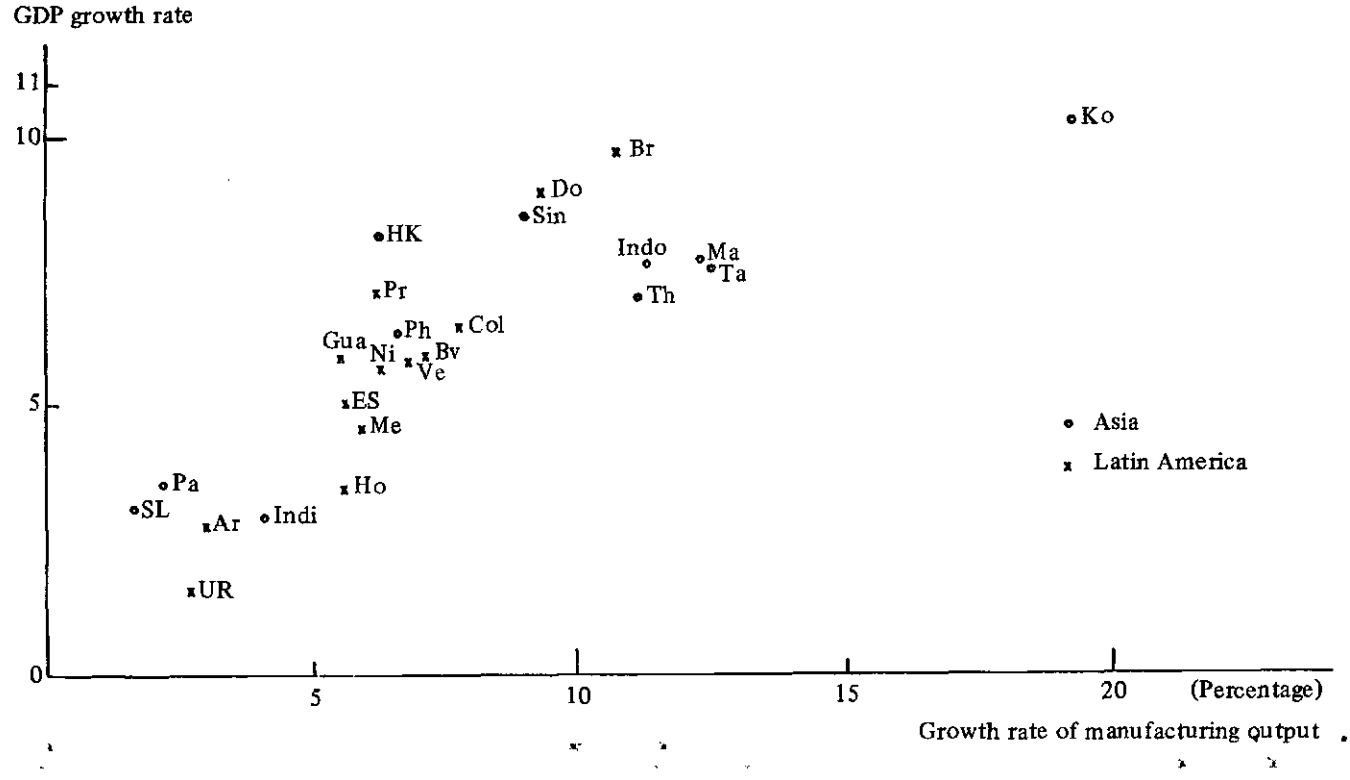
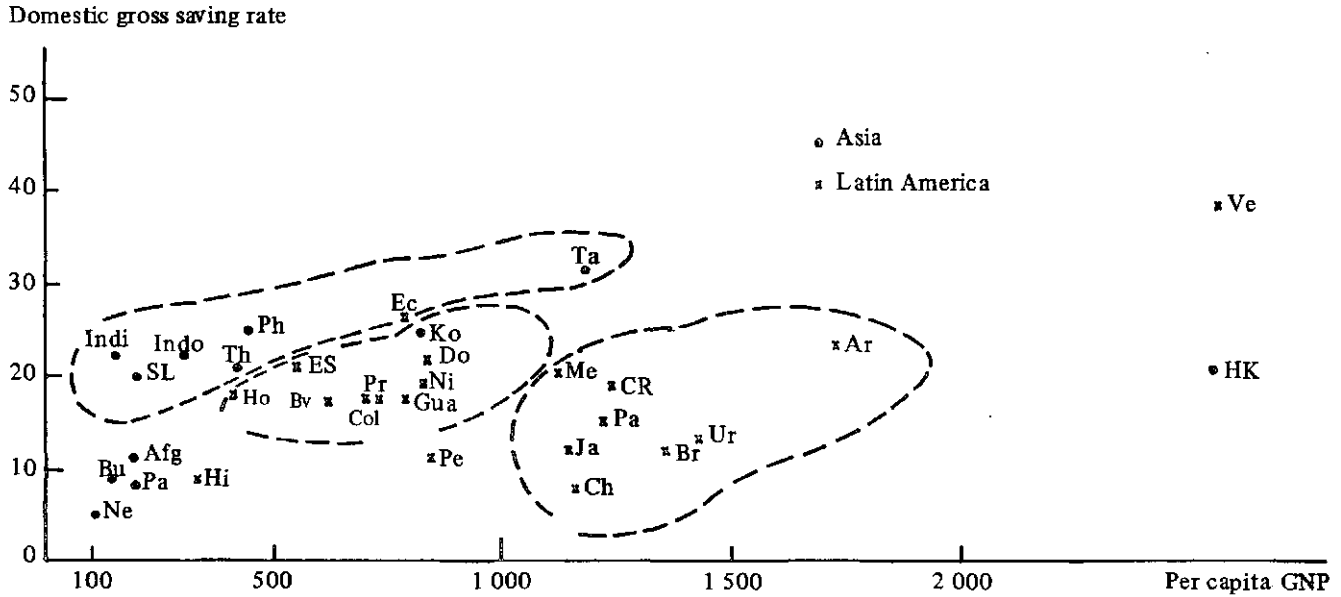


Figure 3

LATIN AMERICAN AND ASIAN COUNTRIES: RELATION BETWEEN GROSS DOMESTIC SAVINGS RATIOS AND PER CAPITA INCOME LEVELS, 1977



is clearly identified for the latter in the shape of a sharp sudden increase in the investment ratio, particularly in the case of the Republic of Korea, while this is not distinctly identified in the former, although their investment ratio *vis-à-vis* the GDP has clearly increased in some countries, starting from a relatively higher level at the beginning of the 1960s. Thus the latter's investment proportion became bigger than that of the former during the postwar process of industrialization (in 1977 it was 19-22% for the former versus 25-34% for the latter). A rough check of the magnitude of incremental capital-output ratio of these countries reveals no significant difference between the two regions. Therefore, we are much inclined to say that the savings investment behaviour and its effects on the growth rate seem to vary significantly between SICs of the two regions.

Recent debates on the NICs stem primarily from international problems, as has been mentioned previously, so that this aspect, and especially the possible expansion of exports of manufactures from these countries, has been the main focus. What is of most concern to us in this respect, however, as well as in a longer-term perspective of the semi-industrialized phase, is that i) expansion of exports of industrial goods is an indispensable element for promoting industrial dynamism for all SICs and pre-SICs but ii) its degree of significance cannot be the same for all countries. As a matter of fact, the second item seems to be one of the most important points in recognizing the real characteristics of the Latin American economy, especially of its SICs, and particularly in comparison with the economies of the Asian semi-industrialized countries.

The average annual growth rate of merchandise exports has been kept exceedingly high in Asian SICs. For example, it was 36% in 1960-1970 and 32% in 1970-1976 in the Republic of Korea and 24% in 1960-1970 and 16% in the latter period in Taiwan. The record of Latin America is much more moderate: 4.6% in 1960-1970 and 10% in 1970-1976 in Brazil; 3.2% in 1960-1970 and 2.9% in 1970-1976 in Mexico. More specifically, the percentage shares of manufactures in the total merchandise exports show a notable difference between Latin American and Asian SICs: in 1975 this share was 25% for Argentina, 27% for Brazil, 30% for Uruguay and 50% for Mexico, but as high as 82% for the Republic of Korea and 97% for Hong Kong. It is actually hard to identify a case of the so-called "export-led growth" in Latin American SICs, although the share of manufactured goods in total merchandise exports has increased in these countries at a considerable pace in the process of industrialization. It goes without saying that the share of primary products has remained comparatively high in these countries, and this will be an important topic for discussion in the sections that follow regarding the problem of applying the thesis of a shift from import-substitution to export promotion. What is of concern to us here is again the recognition of the different historical and typological conditions, which are indispensable factors in considering such widely varying patterns of international trade expansion between the two regions, although we are ready to admit to a certain extent the importance of the results of different strategies taken by the governments with regard to the industrial and trade policies of these countries in the past. The differences in country size and natural resource endowment are particularly relevant. In this regard, it may be noted that even in the smaller Latin American countries, their

degree of export dependence tends to be comparatively high compared with the general international tendency.

This fact is even more significant when it is recalled that in Latin America the present SICs are large, while in Asia they are smaller, even city-states being included. Brazil and Mexico, together, for example, account for almost half the total population of Latin America, while four countries of East and Southeast Asia —the Republic of Korea, Taiwan, Hong Kong and Singapore— represent only 18% of the total population of this region. In Asia, the larger countries rather lag behind in the process of industrialization, although the People's Republic of China is now rapidly improving her position, but in Latin America just the reverse is taking place. We are not able to offer an explanation for this, but it is an important point in characterizing the semi-industrialized countries, particularly as regards their role in regional development.

B. PROBLEMS FOR FURTHER INDUSTRIALIZATION IN LATIN AMERICA: PRODUCTIVITY AND EMPLOYMENT

In the light of a number of official documents prepared by both individual governments and international agencies in Latin America, we are convinced that the basic objetive of socioeconomic development in this region is essentially to achieve "growth acceleration with more social equity" for the future, although the terms and way of expression may differ among them. The new strategy of development to attain these objectives has been formulated in view of the shortcomings of past experience, since the impressive growth results were not shared by the mass of the people. Such a shift of objectives and strategy in recent years has not necessarily been unique to this region, but rather a general phenomenon seen in other regions as well. The difficult and complex problems confronted in the process of achieving these objectives seem to be basically of the same nature, quite apart from the simple concept of recognizing "trade-offs" between the two objectives, growth and equity. However, Latin America has its own characteristics with respect to the pattern and mechanism of growth and structural changes, as has been discussed in the preceding section, and the conditions therein, both historical and typological, are different from other regions. The solutions to the problems it confronts should be searched for formulating policies and measures which are appropriate taking into account these characteristics.

Viewed from the specific aspect of the new industrialization process of the Latin American countries, what has been mentioned in general terms above can briefly be translated into the following, referring to the recent ECLAC documents. First, the strategy of promoting further industrialization as a dynamic force for accelerating economic growth has its own requirements, which are characteristic of the semi-industrialized phase. Two requirements, in particular, are specifically emphasized: i) improvement of industry's own structure through progress in the production of capital and sophisticated intermediate goods and ii) further expansion of exports of manufactures to help overcome the chronic tendency towards an external bottleneck. The first of these

naturally calls for creating technological input-output linkages with other sectors of the economy as well as within the industrial sector, generating dynamic effects through increased demand for capital and intermediate goods towards promoting the manufacture of consumer goods. This process is closely linked with the second requirement, since such structural progress would make it possible to participate in the more dynamic flows of international trade. There would be a tendency towards intra-sectoral specialization in a more symmetrical pattern of trade, and hence the acquired comparative advantages arising from the process of further industrialization would be added to the natural comparative advantages due to the richer resource endowment.

Secondly, there are naturally social implications in carrying out industrialization of this type, since it obviously involves effects on employment, income level and distribution. A widely-held view emphasizes the possible favourable "multiplier effects" on employment which may be expected as an indirect result of such a pattern of industrialization, rather than stressing the significance of direct effects on employment due to the absorption of more labour into the industries themselves, since it is recognized that in the past the role played by industrial growth in absorbing labour has not been very significant. This view appears also to be backed up by the widespread recognition that the acceleration of industrial growth rates in the future should be secured also through faster rates of productivity increases. This view also tends to emphasize the indirect effects of such structural changes in industrial growth, an income level and through mutually related changes such as faster diffusion of technological progress, wide participation of working people of the lower strata and possible expansion of the domestic market, which could bring about profound modifications of patterns of income distribution in the direction of appreciably greater equity.

Promotion of international economic co-operation can be efficiently implemented only if the benefits are mutual, that is, if they are shared among the countries concerned, in this case between the Latin American countries and Japan, these benefits can only be fully realized if the objectives and strategies of socioeconomic development in the former are understood correctly by the latter and vice versa. In this sense, these views have been summarized above, so as to provide the starting point for the discussions that follow. This does not necessarily mean that these views can be taken for granted, but they would require our own interpretation based on our research results. We shall discuss several major aspects of them below.

It is our view that attainment of improvements in overall industrial efficiency must be one of the key elements for accelerating industrial development. To be successful in this direction, rapid technological and institutional progress, appropriate to the prevailing conditions of the countries concerned, is essential and indispensable. This would appear to be valid in general, irrespective of different phases of industrial development. However, it is particularly important in the semi-industrialized phase, because the preparations for establishing the necessary conditions for taking such a step have in most cases been carried out in the recent past and the potential for making faster progress in the technological field are greater than in the case of either the initial phase or the fully-industrialized phase. This is the basic reason

why the countries in the semi-industrialized phase have achieved faster growth rates than countries that are in other phases, as has been shown in the preceding section.

It is our belief that the view stated above in terms of development phases is consistent with the well-known thesis of "infant industries" in the sense that a level of efficiency lower than international standards can be accepted provided the gap is not too wide and does not last too long.

This was also true internationally in the prewar period, as is illustrated by Japan's experience. The accelerating trend of its growth rate was essentially attained by successive technological innovations, the basic knowledge for which had been borrowed from Western advanced countries. Today, the potential for so doing is much greater due to the far richer international store of advanced technological knowledge available than in the past. This is the basic reason why the industrial growth of contemporary SICs has been much faster than in the prewar period. This does, however, imply a more difficult problem whose solution calls for greater efforts by the contemporary latecomers, i.e., the problem of how to fulfill the necessary conditions for making such fast technological progress. This is the main reason why growth rates vary widely among countries at the same development phase. It is our view that the institutional and organizational set-up, among other factors, is the most important prerequisite of faster technological progress. The functions and forms of this set-up appear to vary widely among countries. The possibility of transfer from advanced countries is generally more difficult, because these often have different historical and social structures from the SICs.

The important relationship between technological innovation and institutional-organizational progress is implicit in the statement above. This is derived from analysing Japan's historical experience. In brief, it can be stated that technological innovation in the latecomer countries, for which the possibility of technology transfer from advanced countries is crucial, needs specific carriers to implement it, and that this can be efficiently accomplished when the functions of the carriers, namely the institutional-organizational set-ups in the latecomer nations, can satisfactorily meet such requirements. This includes the organization of industrial production, the relations between large-scale industries and medium/small industries, the local organization of private enterprises in relation to the activities of multinational enterprises, the role to be played by the government in guiding technology transfer, in particular for modern industries. These, among others, are important illustrations of the importance of this specified aspect.

Through discussions and the exchange of views between both sides —Latin America and Japan— it has been clarified that the situation in respect of this problem differs between the two, in particular in the institutional set-ups linking modern industrial enterprises and traditional (medium/small scale) enterprises and the role played by the government in the process of transferring modern technologies from advanced countries. We share the view that these differences stem basically from socio-cultural differences.[2] Nevertheless, we also share the view that the thesis drawn from Japan's experience is of relevance to Latin America. The functional relationship thus defined between

technological innovation and institutional and organizational improvement will be a basic consideration, in the light of which we will later discuss new forms of economic co-operation between Latin America and Japan.

To deal more specifically with technological progress at the semi-industrialized phase, let us now examine the level and type of technologies required to promote industries producing capital and sophisticated intermediate goods. It is generally accepted that a shift to industries of this kind is one of the basic characteristics of this phase and that technological and input-output linkages should be widened and strengthened. However, it would be more realistic if the nature of these technologies and industries were clarified, at least in terms of factor proportions, say capital-intensive versus labour-intensive type. This is because they are often automatically assumed to be of capital-intensive type. Our research on Japan's case reveals that this is not necessarily so, and the data on Mexico and Brazil, though less comprehensive, appear to endorse this. The point can briefly be stated as follows.

i) It is true that most of the modern intermediate goods are produced by such "heavy" industries as petroleum, chemicals, iron and steel and non-ferrous metals, and capital-intensive technologies prevail in these industries, their level being remarkably higher than that of all other industries, including capital-goods producing industries.

ii) If "capital goods" are assumed to be equivalent to investment goods, their actual coverage is usually very wide. What is meant by this term, however, can more or less be represented by what we call "engineering industries", although these also include manufacture of consumer durables. These industries produce machinery and metal products with low capital-labour ratios whose average is scarcely different from that of the textile industry, the representative traditional sector. Thus it is better to make a distinction between capital goods and intermediate goods, and not to make a general assumption that a shift from the traditional to modern industries would always involve a distinct rise in the capital-labour ratio.

iii) An even more important distinction which should be made between, for example, the machinery and textile industries, is the difference of technological level in the modern sense: on average this is higher in the former than the latter, apart from the traditional manual skills. This is indicated by the wage differentials between the two industries. It goes without saying that the modern intermediate goods industries require a markedly higher technological level. Japan's historical process of industrial development may be worth recalling in this regard. Compared with the earlier case of achieving the necessary industrial efficiency for establishing textile industries, a much longer time was needed to establish intermediate goods industries and engineering industries which were really competitive internationally (this was finally achieved as late as the first half of the 1960s).

iv) Finally, a few words are called for on capital efficiency. In talking about industrial efficiency, not only labour productivity but also capital productivity should be taken into account, particularly in view of the fact that capital is scarce while labour is still abundant in the semi-industrialized phase. Japanese data

reveal that the amount of added value produced per physical capital stock (the reciprocal of the capital output ratio) tends to be higher in both engineering industries and in the traditional industries, whereas for heavy industries it is much lower. This difference by industry is combined with difference by size of establishments or enterprises: capital productivity is higher in the case of smaller establishments (except very small ones), while it is lower for larger sizes. When considering the appropriate type and efficiency of technology, this fact should be more carefully taken into account in the context of the close relationship between technological progress and institutional and organizational improvement, mentioned above.

The effects of industrial development on employment have long been a controversial issue in the areas of both analysis and policy-making. On the one hand, it is asserted that there are trade-offs between productivity rises and employment increases, while on the other, possible compatibility between the two objectives is assumed. On the basis of the results of our research we are much inclined to say that industrial growth can play a dynamic role not only in raising productivity but also in providing increased job opportunities. In this respect, there should be more recognition of the positive role played by industrialization with respect to employment. The real problem at issue is to ascertain the quantitative relationship between the rate of productivity increase and the rate of employment increase, as both are involved in a given rate of industrial growth, rather than to make *a priori* a rigid assumption. The crucial point is to correctly evaluate the employment effects of output growth rates and those of the different choices of technologies and industries. It is generally held that labour-intensive technology is more favourable to increasing employment. We cannot deny the validity of this, but at the same time it should be said that a greater rate of industrial growth often seems to be more influential.

This may be illustrated by the following example. It is a commonly held view today that a shift from a phase of import substitution to a phase of export promotion implies changes in the technological and industrial structure from a capital-intensive one to a labour-intensive one, especially in the phase of semi-industrialization. Thus the elimination of the policy bias against exports would bring forth an acceleration of the rate of labour absorption into the industrial sector. The following statistics, or similar ones, have often been cited as evidence. The average percentage annual rate of increase in employment in the industrial sector in the "export promoting countries" was much greater than in the "import substituting countries" (in 1960-1970 for example, the figures were: Republic of Korea 11.2, Taiwan 6.3, and Singapore 5.6, as against Mexico 4.5, Colombia 3.7, and the Philippines 2.5). As will be discussed later, a dichotomy between export promoting countries and import substituting countries is too mechanical a classification. Apart from this, however, what interests us is the varied growth performance of industry among these countries, as indicated by the much faster average percentage annual growth rate of industrial output in the former group of countries than that of the latter group (in 1960-1970, the figures were: Republic of Korea 17.2, Taiwan 16.4, and Singapore 12.6, as against Mexico 9.3, Colombia 6.0, and the Philippines 6.0). The problem is to clarify whether the difference in the growth rate of employment witnessed between the two groups of countries is to be explained by the growth of

industrial output rather than the difference in factor proportions in the industrial structure: i.e., labour-intensive versus capital-intensive?

The doubt cannot be cleared up without reliable data on the capital-labour ratio and its change over time, and it is not possible to obtain such information comprehensively for the SICs at this stage of our empirical studies, particularly because of the lesser availability of data for Latin American countries, despite our research efforts. However, it is possible to evaluate the relationship expected between the growth rate of industrial output, GY (or productivity, Gy) and that of the increase in employment (GL). As a rough measure, let us observe the performance of the crude elasticity, η = GL/GY, calculated from the figures mentioned above. The figures for this elasticity are: Republic of Korea 0.65, Taiwan 0.38, Singapore 0.44, Mexico 0.48, Colombia 0.61 and the Philippines 0.41. It is suggested that the variance of these crude elasticities is not associated with any criterion for such a grouping: its range does not show any distinct difference between the two groups of countries. Thus our tentative conclusion is that the shift to labour-intensive industries, if it takes place, may have rather more limited effects than are usually expected on increasing the labour-absorption power of industrial growth. However, it is important to note the "if". As has been explained previously, the capital-labour ratio of manufacturing is much more homogeneous than is usually expected. For example, a structural change from textiles to engineering industries may not bring forth a distinct increase in the capital-labour ratio and hence a change in the labour absorption capacity of manufacturing. A relatively marked impact can only be expected from a fast structural change towards heavy industries, and this may not be the case in an early part of the semi-industrialized phase, although it is admitted that Latin American SICs tend to develop these industries earlier than East Asian SICs.

It may be more important, as has previously been suggested, to assign much more significance than usual to the employment effects of industrial growth accelerations. With the aim of providing more background knowledge on this suggestion, we have made an attempt to examine the performance of the crude elasticity of the industrial sector by comparing Latin American and Asian countries within the limits of the available data. In so doing, η is taken as GL/Gy in order to see directly the relationship between GL and Gy, the rate of labour productivity increase. The results are summarized below (the period is not the same, covering the 1960s and 1970s):

	Asia				Latin America		
	GL	Gy	GL/Gy		GL	Gy	GL/Gy
			Percentages				
(1)	3.1	5.7	0.54	(1)	2.1	3.8	0.55
(2)	1.8	3.5	0.50	(2)	1.5	2.6	0.58

Asia: (1) Republic of Korea, Taiwan; (2) Thailand, the Philippines, India, Sri Lanka and Indonesia.

Latin America: (1) Mexico, Brazil; (2) Colombia, Peru, Guatemala, Chile and Bolivia.

These figures provide only a very broad appraisal, yet they seem to indicate a relative constancy of the crude elasticity, GL/Gy, around 0.5 ~ 0.6, irrespective of the regions and development phases. The implication is that productivity will engender an increase in employment at approximately half its rate, and that there is no reason to expect this relationship to change to the detriment of employment increases in the process of shifting from the phase of initial industrial growth to the semi-industrialized phase, which undoubtedly implies an acceleration of the growth of productivity. Analytical interpretation of the findings is beyond our present purpose, but at least we can point out that such factors as the rate of production function shift realized by technological and institutional progress, the effects of enlarging economies of scale, and the indirect effects of increasing interlinkages within the industrial sector —all operate in an interactive manner.

The conclusion to be drawn for our present purpose, from the somewhat lengthy discussion developed above is that for Latin American countries a general assumption as to the positive association between output- productivity increase and employment increase can be made without any major reservations, and that policies aimed at accelerating the rate of industrial growth, and hence of overall improvement in industrial efficiency, are of the highest priority.

C. PROBLEMS FOR FURTHER INDUSTRIALIZATION IN LATIN AMERICA: INTERNATIONAL TRADE AND THE DOMESTIC MARKET

What has been discussed above is part of the subject of improvement of industrial efficiency and as such can essentially be applied to the problem of expanding international trade. The thesis of shifting policies from import substitution to export promotion has often been taken up as the main approach for analysing the industrial growth strategies of almost all LDCs, irrespective of their different historical and typological features, especially as regards country size and natural resources endowment. This approach sometimes seems to tend to criticize the trade performance of a number of Latin American countries as less progressive, involving prolonged import substitution and/or less intensive export promotion efforts, as compared to the experience of East Asian countries. If such an attitude is merely combined with the aforesaid characterization in terms of factor proportions (capital-intensive versus labour-intensive) it is all the more inappropriate, in our view, for grasping the real trade problems of Latin American countries.

Many countries of the region are now highly conscious of the necessity for simultaneous implementation of both promotion of exports of manufactures and more advanced import substitution, centered on capital goods and sophisticated intermediate goods, as already noted. In larger countries such as Brazil and Mexico, the intention to proceed with such import substitution has officially been announced, while vigorous measures to promote the export of manufactures are maintained. The members of the Andean Subregional Integration Agreement (Venezuela, Colombia, Ecuador, Peru and Bolivia),

which are making similar efforts at export promotion, recently confirmed their decision to intensify the import substitution of capital and intermediate goods at the regional level, when they agreed upon the sectoral programme for automobile production in 1977. Other sectoral programmes such as those for metal products, machinery and petrochemicals are already in the process of implementation.

The general view is that the so-called "import substitution industrialization" through high protection policies with related measures had largely ended by the mid-1960s, and since then there has been a new phase with emphasis on export promotion in Latin America. Actually, however, import substitution and export promotion, in our view, are pursued simultaneously rather than successively in each country in terms of a "by industry" approach —a trade growth path similar to Japan's historical experience. In relation to this aspect, the phenomenon of the "successive sequence" of the import substitution process is noted for countries at varied phases of industrialization in the region as a whole. For example, if we define import substitution of traditional manufactured goods as "primary", in a way slightly different from the usual use of this term, the primary import substitution was already completed by 1970 in SICs like Brazil and Mexico, while in other less industrialized countries it was still going on. At present, "secondary" import substitution of capital and sophisticated intermediate goods is, as already noted, a major issue in the former countries, while for some of the latter countries it is only in its infancy.

Bearing in mind the above, let us now discuss the characteristics of the Latin American trade structure, focusing on the region's SICs. In order to fuel the secondary import substitution process, expansion of exports not only of traditional manufactured goods but also (and still more important) of agricultural and mineral goods is needed in these countries. The necessity of such simultaneous expansion of exports of both types of goods, one based on "natural" and the other on "acquired" comparative advantages, characterizes these countries' trade pattern and structure, although the trend is towards an increase in the share of the latter and this is one of the aims of industrialization policies. In this respect a sharp contrast is seen, for example, between Brazil and the Republic of Korea, the secondary import substitution of the latter being solely dependent upon the expansion of exports of traditional manufactured goods because of its poor land resources.

The problem of the time scale for implementing secondary import substitution policies has often been raised and this is relevant to the above discussion. It is often asserted that if these policies are implemented too early, in an artificial way, rather than following a "natural" course of industrialization, this will be inefficient and is not to be recommended, particularly if heavily supported by continued protection policies and measures. It is hard to define a "natural" course of industrialization for each country concerned and it is difficult to make precise and realistic real evaluations of the effects of protection and other relevant measures. Nevertheless such an assertion is worth noting. Despite the efforts made in data treatment, we cannot make a precise statement with regard to the case of Latin American SICs with quantitative indicators to show the degree of deviation from "natural course". However, one important

aspect relevant seems clear, namely, the aspect related to the level of technology and the time sequence of its progress, in the industries at issue and this will be the subject to be discussed below.

The share of machinery and transport equipment in exports of manufactures in recent years seems to differ relatively little between Latin American and East Asian SICs (ranging from 50-60% in 1976), while the share of primary commodities other than fuels, metals and minerals in total merchandise exports is extremely high in the former (Brazil 62%, Mexico 69%) as against the major share of traditional manufactured goods such as textile, clothing, etc., in the East Asian countries (for example, 71% in the Republic of Korea). This contrast suggests that a speedy shift to the domestic production of capital goods and sophisticated intermediate goods has been taking place up to the present in Latin America, without a long and extensive experience of industrial and trade expansion in the area of traditional manufacturing. This may partly be the result of deliberate policies, but in our view it may essentially be the concomitant of the "natural" comparative advantage due to richer natural resource endowment. The resultant effect is that special efforts are required to succeed in promoting domestic industries to carry out secondary import substitution, because technological progress is a much more influential factor in this process of secondary import substitution than in the case of the primary process, as is illustrated by Japan's experience, and the required time sequence of technological progress from the primary to the secondary phase must not be underestimated.

From this standpoint, we share the view that not only the capital and intermediate goods industries, but also manufacturing industries which can increase added value to natural resources, agricultural and mineral, should be given more encouragement as vigorous export industries —an area basically not covered by the conventional approach involving the import substitution-export promotion sequence.

Expansion of international trade is a crucial requirement for overcoming the chronic tendency towards an externl bottleneck. This is valid for all SICs. However, with respect to its relative significance, there are differences among these countries mainly due to variations in their size. As previously mentioned in chapter 1, the leading role played by export growth in accelerating overall economic growth is relatively limited for large countries, such as Brazil and Mexico, compared with East Asian SICs. This fact implies much greater relative importance of the expansion of the domestic market in countries of the former type. It is our view not only that this aspect is perfectly legitimate, but also that there is great future potential for realizing the benefits of expanding the domestic market in Latin America. Several points relevant to this aspect will be discussed below.

i) The effects of securing economies of scale have previously been dealt with in relation to technological progress. As is well known, the products of engineering industries, and especially the automobile industry, are illustrative of this, but such economies can be more widely applied to manufactures in general. In addition to achieving a higher per capita income level, the impressive growth in the past brought forth changes in income distribution, it is statistically reported, in favour of the middle-income classes in the large countries. These are

factors which can support the achievement of economies of scale and which would be strengthened if the income distribution could be changed also in favour of the lower classes, as will be discussed later.

Analytically, economies of scale cannot be clearly singled out from the overall effects of industrial efficiency, being combined with the effects of technological and institutional progress and the expanding and deepening of interlinkages among industries. This has been suggested previously in the discussion on the relation between productivity and employment. Therefore quantitative evidence cannot be presented solely in respect of economies of scale. The important point in the present connection is that all these kinds of favourable effects for accelerating industrial growth can be assumed to operate in an interconnected manner. An illustration can be drawn from the postwar experience of Japan, covering a decade approximately from the mid-1950s to the mid-1960s, i.e., the last period of its semi-industrialized phase. The rate of export expansion was remarkable, but the proportion of exports to GNP had not been increased, as the domestic mrket expansion had been kept at the same rate of increase. This is the period of "investment spurt" which the previous discussion has mentioned. Natuturally, a distinct increase in the rate of capital investment would be required as the facilitating factor for securing such cumulative effects from the interacting operation of these factors at issue. Some other facilitating factors can be mentioned. For example, in a large country, capital investment for the infrastructure can be said to be an important condition, and this is certainly true of Latin America. Nevertheless, what is of concern to us here is suggesting a possibility of rapid domestic market expansion, together with export promotion, realized in a country of medium size.

ii) The structure of income and wealth formation, already touched upon above, is an aspect which needs amplification. It has often been pointed out that personal income distribution by size has been made unequal in a number of Latin American countries. Some statistics appear to confirm such a trend, and sometimes this is emphasized in contrast to the East Asian SICs, whose income distribution is presumed to have become more equal in the process of semi-industrialization. According to our survey of the studies of this kind into both groups of countries, however, the statistical evidence for asserting such a view does not seem to be convincing enough and would need closer scrutiny. Nevertheless, there are more convincing facts which account for these phenomena. First, the structure of agriculture in Brazil and Mexico is very different from that of the Republic of Korea and Taiwan, where land reform was carried out in addition to the less distorted land distribution which prevailed to start with. This is often called bimodal versus unimodal structure. Second, eradication of absolute poverty still remains an urgent problem for Latin American countries, including its SICs, while in the East Asian counterparts it has more or less been completed. Where the two regions coincide, of course, is that the problem of absolute poverty is mostly found in rural districts. Leaving the first aspect for later discussion, let us discuss the second in some detail below.

A rise in the real wages of unskilled labour is the most crucial indicator which marks the turning point of the economy from the initial phase to the phase of semi-industrialization. This classical concept has found its empirical

endorsement in the historical process of development of East Asian countries such as Japan, the Republic of Korea and Taiwan. It is our view that this is the result of a remarkable increase in the demand for unskilled labour by industrial growth in relation to the labour supply situation prevailing in the non-industrial sector. The possible mechanism of such an increase in the demand for labour was already discussed in the preceding section. The point at issue here is that for Latin American SICs, such a turning point cannot as yet be identified distinctly enough despite our research efforts. The data limitation is serious and the effects of wage policies are involved, and we cannot say for certain that these countries are still at the pre-turning point, but the existence of surplus labour and even its growth, especially in rural districts, cannot be completely denied. In this respect, it is important to note that the rate of increase in the labour force in most Latin American countries has been much higher than that of Asian countries on average. This is particularly important in making a comparison of the SICs in the two regions. The different labour market situation in SICs in these two regions has thus been produced not only by the slower rate of expansion of demand for labour but also by the faster increase in labour supply due to demographic causes in Latin America. With this qualification, we treat the countries in Latin America as SICs in a looser sense. Japan's case suggests that during the process of semi-industrialization, surplus labour has also sometimes been reproduced, suggesting the probable occurrance of a similar situation to that of present Latin American SICs. Certainly the existence of absolute poverty has its relevance to the persistence of surplus labour, though the two are not the same phenomenon. If these countries become more successful in eliminating surplus labour by accelerating their industrial growth in the future sufficiently to raise the incomes of the lower strata, this would help very much to equalize income distribution and hence to expand the national domestic markets for mass-consumption goods.

Agriculture is still one of the most important sectors in SICs in terms of both output and employment. For the reasons mentioned above, however, the nature of its differential structure needs to be further clarified with regard to the possibility of enlarging the domestic market. First, our research and the exchange of views among us have clarified the nature of the bimodal structure in the following sense. There are two subsectors within agriculture. One is that part of agriculture which is devoted to the internal market and to exports on the basis of its natural comparative advantages, together with mining, assuring the necessary foreign exchange to finance the import substitution process of industry. The other is that part of agriculture that does not export its product but is essentially carried on by small subsistence peasants, in contrast with the first, which is carried on by commercial farms. The combination of the two is complex, and it is often difficult to draw a clear line between them. Furthermore, the situation tends to vary much from one country to another and a sweeping generalization may be risky. Yet, for the countries of larger size, such division into subsectors seems to have its significance in relation to almost all the discussions we have developed in the previous sections. The importance of the commercial, export-oriented subsector, together with the potentiality of expanding the area of cultivated land, is of great importance for foreign countries such as Japan which have to import food and feedstuff. The latter

subsector of peasant farming is of direct concern here as the appropriate technological and institutional innovations have not taken place in this subsector. As will be described in more detail in chapter 2, part two, in our view there seems to be great future potential for encouraging and promoting such improvement and innovations. The expected progress in this direction would help to expand the domestic market.

The strategic significance of promoting interlinkages of input-output and technologies between agriculture and industry should be emphasized here. Plans for the transfer of technology from industrialized countries should include such types of technology as may be appropriate for fulfilling such a purpose, and the local innovations and improvements with respect to both engineering and biological/chemical-type technologies should be carried out with this objective in mind, going far beyond the conventional purpose of merely carrying out secondary import substitution.

In essence, this view can also be adopted to the case of small-scale and cottage industries, which will be discussed in some detail in chapter 2, where the importance of promoting development of these industries will be emphasized. These are the areas where labour-intensive technologies are appropriate. Needless to say, there is no inconsistency between this emphasis and that placed on accelerating output and increased productivity in the industrial sector mentioned earlier. In recommending development of such small-scale industries, our assumption is always that increased growth of output and hence of employment are possible for these industries by fuller use of their interlinkages with modern, large-scale industries through input/output, technological and institutional channels.

Chapter 2

NEW FORMS OF ECONOMIC CO-OPERATION BETWEEN LATIN AMERICA AND JAPAN

Introduction

Economic relations between Latin America and Japan have expanded rapidly during the past two decades. The increase has been very remarkable not only in trade but also in direct investment, finance, technical co-operation and other aspects.

The value of Japan's exports to Latin America grew from US$ 304 million in 1960 to US$ 6 555 million in 1979, with an average annual growth rate of 17.5%. Japan's imports from Latin America increased from US$ 311 million in 1960 to US$ 4 517 million in 1979, with a 15.1% average annual growth rate. Japan's share in Latin American trade has thus greatly increased since 1960. Of Latin America's total exports, Japan's share increased from 3.2% during the first half of the 1960s to 5.0% during the second half of the 1970s. As for imports, the share from Japan increased from 3.5% to 7.2% during the same period. However, it should be noted that because of the higher rate of increase in Japan's exports to Latin American countries than in the latter's exports to Japan, the trade balance between the two became unfavourable for Latin America towards the end of the 1960s and this situation has continued to the present.

As for Japanese direct investment in Latin America, this has shown a dynamic increase since the end of the 1960s, after experiencing a relatively slack period. As a result, as of the end of March 1979, the cumulative approved investments from Japan totalled US$ 4 373 million or 16.3% of Japan's total direct overseas investments at that time. Its investments in Latin America were third in rank, coming after those in Asia and North America.

In 1978, Japan's financial co-operation[3] to Latin America amounted to US$ 2 702 million or approximately 30.2% of the total funds of US$ 8 948 million directed to developing countries by Japan (including contributions and loans through international financial institutions). It should be noted, however, that within the above figure the amount of official development assistance to Latin America is rather small. In financial co-operation, large-scale projects in major countries of the region (particularly Brazil) are increasing. This, along with trade, has been one of the important factors in expanding economic relations between Latin America and Japan.

As seen above, relations between the two parties have expanded remarkably up to the present without encountering any serious set-backs, and it is expected that the economic relations between them will become increasingly important in future. However, the mere continuation of past trends may not guarantee the achievements expected for the future on both sides, particularly in view of the recent problems Latin America and Japan face, both internally and externally. Hence, mutual co-operation to facilitate the attainment of the desirable expansion of economic relations seems highly important.

The purpose of this chapter is to present the conceptual framework for the studies on such mutual co-operation (included in part two of this report) as well as to summarize systematically the principal conclusions of the studies on co-operation in specific areas.

A. ECONOMIC AND SOCIAL DEVELOPMENT AND INTERNATIONAL CO-OPERATION

1. Basic economic features of Latin America and Japan

a) *Phase of development and resource endowment*

Over the past quarter of a century, the Latin American countries have achieved a relatively high level of industrialization and accelerated economic growth. Now, Latin American countries have three important characteristics: first, the semi-industrialized phase which the main countries of the region have reached while the others are now arriving, second, the advantage of rich natural resources that most countries of the region share and third, the vast internal market that some countries or regional groupings (such as the Andean Group) in Latin America possess. This means that the Latin American countries now have strong possibilities for achieving still greater economic development. On the other hand, however, this means that they must solve a number of problems, both external and internal, which are rather typical of the semi-industrialized countries, as discussed in chapter 1.

Since the last years of the 1960s, the Japanese economy has experienced an important period of transformation, crossing the so-called turning point to the fully industrialized phase involving limited use of labour. This process has brought forth problems because of its increasingly heavy dependence on imported natural resources.

Thus, the economic relationship between Japan and the semi-industrialized countries tends generally to be of a substantially complementary nature. It may be added that the considerable geographical distance between Latin America and Japan could have some important implications for their mutual economic relations, particularly as regards trade and transport.

b) *Requirements of both parties and development strategy*

In order for the Latin American countries and Japan to achieve their further economic and social development, they will have to cope with their particular requirements determined fundamentally by the above-mentioned

respective phases of development, as well as their different resource endowments. The Latin American countries, for their part, must face the special requirements which characterize the semi-industrial phase, in particular attainment of higher output and higher levels of employment with more equity, development of both the modern and traditional sectors, etc., as discussed in chapter 1. In order to meet these requirements, the countries of the region need technology, financial resources, access to markets for their manufactures and primary products, etc. As for Japan, it is almost needless to mention that it is crucial for it to assure itself a stable supply of energy and mineral resources, foodstuffs (both agricultural and fishery products) and forest products.

It is also important to take into account the development strategy of the Latin American countries, as we can identify some important common features in the development strategies of the individual Latin American nations. It should be noted, first of all, that the countries of the region have been giving increasingly strong emphasis to the problem of equity in recent years. It is also true that most of the countries are trying to achieve further economic growth by developing heavy and chemical industries and increasing the production of capital and more sophisticated intermediate goods. They are at the same time striving to expand their exports of manufactured goods, as well as to diversify the areas of trade. As for trade policies, many countries in the region have been adopting more liberal and open policies, through efforts such as relaxation of import restrictions and of exchange rate adjustments, keeping a level of protection that is adequate to pursue the development of the new industrial sectors already mentioned.

In this context the following specific features that have direct relation with the international relations of Latin America seem to be highly relevant in connection with the above-mentioned aspects.

1) Problems of equity and economic growth are closely interrelated with the external sector. In order to avoid an intensification of the present serious problems of extreme poverty, marginality and unemployment in the labour force, it is necessary to achieve a high rate of economic growth. This would pose, on the other hand, delicate problems of external sector bottlenecks. Therefore, it would be necessary to achieve a fast rate of growth of exports, an inflow of foreign funds and a rate of growth of imports not exceeding the import capacity.

2) An important proportion of the labour force has a relatively high level of education and industrial skill while the cost of labour is still lower than in developed countries.

3) High technology goods will continue to be imported in a high proportion from developed countries. As the demand for these goods increase very quickly, imports by Latin America from those countries will be very dynamic and only limited by import capacity. The region will also continue to be an important buyer of non-incorporated technology, such as patents and engineering services. Latin American countries wish to acquire foreign technology in a way that is consistent with the strengthening of indigenous capability in the field of technology.

4) Private sources of financing, especially of transnational banks, have considerably increased their share in total external financing of Latin America. Official sources, while less significant for total external financing, are still important for small and medium-sized countries. Latin American countries have a strong interest in issuing long-term bonds in foreign capital markets.

2. Basic considerations on the necessity for and forms of co-operation

It seems obvious that some co-operation is necessary in order for economic relations to satisfy the requirements of both sides as much as possible. In other words, mutual benefits from these economic relations can be attained in an optimum manner through co-operation. Here mutual benefits should be evaluated on the basis of the requirements of both sides as well as the development strategies they adopt. The diversification of economic relations, rather than mere complementarity, should also constitute one of the basic principles of co-operation.

There are different options (and forms) through which both sides can co-operate, but it is necessary to adopt the most appropriate one in order to maximize the above-mentioned mutual benefits. In this sense real co-operation should mean that both sides must make policy adjustments, institutional adaptations, and other efforts within the framework or forms of co-operation to be adopted as most appropriate, in order that the co-operation may contribute effectively and mutually to the attainment of the above-mentioned requirements and the diversification of economic relations. When any contradiction arises in the process of co-operation, it should be solved by joint efforts through co-ordination and adjustment.

More specifically, we may take the case of co-operation for the introduction of technological and institutional innovations. As is well known, the process of adaptation of technology is facilitated if it is accompanied by some appropriate institutional changes. Technology is quite flexible, and industrial countries can co-operate in adapting it to the local conditions of recipient countries. But the appropriate institutions that are key factors for such adaptation are very specific and differ from one recipient country to another. In particular, in many cases the building up of an appropriate institutional set-up through the creation of new institutions or the adaptation of existing ones is so closely related with the social structure and socio-cultural factors of the recipient countries that the efforts of these countries are crucial for successful technology transfer. In this sense, optimum results can only be obtained when such efforts are realized in co-ordination with the offorts of technology-exporting countries. The forms of "real" co-operation should envisage co-ordination and adjustment of the actions of both parties to assure such results.

In the past, there has been successful expansion of financial co-operation, including large joint investment projects. This should be maintained and even strengthened in the future, and it could undoubtedly play an important role in solving the investment and trade gaps of most Latin American countries. However, on the other hand it should be recognized that Japanese technical co-

operation has been rather weak in Latin America, in spite of the fact that technological progress is particularly important for countries at the semi-industrial phase. It is our opinion, on the basis of the studies in part two, that in addition to financial co-operation, particularly in respect of large-scale industry and resource development, co-operation for introducing technological and institutional innovation should be extended, especially to small and medium units of production in agriculture and manufacturing.

3. Scope of co-operation

In order for the co-operation mentioned above to be realized, co-operation efforts must not be made in an isolated manner, as has sometimes happened in the past. Furthermore, one form of co-operation should be co-ordinated and integrated with others and a certain balance should be maintained between one type or area of co-operation and others.

Therefore, future co-operation should be as global as possible in the sense of covering different areas and forms of co-operation, while at the same time it should be systematic, in the sense that the different areas and forms of co-operation should be well co-ordinated with each other in a long-term perspective.

Here, particular emphasis should be placed on efforts to narrow the trade imbalance between Latin American countries and Japan. Regarding traditional manufactured goods, Japan should make further efforts to increase its imports of these goods from developing countries. These efforts, together with efforts to implement new forms of co-operation mentioned above, would contribute to the attainment of mutual trade balance, although we could not expect a strict bilateral trade balance between each country of the region and Japan.

With these basic thoughts in mind, we have selected four different sectors —industry, mining, agriculture and ocean transport— in order to make detailed studies on the possibilities for the kind of co-operation mentioned above. Chapters 1, 3, 4 and 5 of part two of this report analyse specific aspects of the respective sectors and examine possibilities and new forms of co-operation between Latin America and Japan.

The principal conclusions of the studies on these specific sectors will be discussed in the remaining part of this chapter.

B. NEW FORMS OF CO-OPERATION IN INDUSTRY AND AGRICULTURE

1. Basic features of industry and agriculture in Latin America and characteristics of co-operation

As mentioned in the previous section, co-operation should be based on mutual benefit. However, the nature of such mutual benefit may be different for different sectors. While industry and agriculture are sectors of high priority from the standpoint of the fundamental requirements of Latin American

development (i.e., the attainment of greater output and equity), the mining and transport sectors are also important for the expansion and diversification of trade between Latin America and Japan.

First, the basic features of Latin American industry and agriculture that are relevant to our consideration of forms of co-operation will be discussed. One of the important common characteristics of these two sectors is their dual (or even more complicated) economic and social structure, where the difference in various aspects between large and small units of production is pronounced and has normally been intensified in the process of "modern economic growth" or in the process by which Latin American countries arrived at the semi-industrial phase of development.

As is well known, the productivity, level of income and types of crops, etc., observed in the large units of agricultural production called *latifundios* differ substantially from those of small agricultural production units in most countries of Latin America. It is important to note that although these differences are fundamentally related with the unequal distribution of agricultural land ownership and holdings in these countries, the limited level of technological progress and lack of resources of small units of production in comparison with large ones have been important factors which have caused widening of the gap.

With respect to the industrial sector, an important finding seems to be the fact that manufacturing in Latin America is characterized by the relatively heavy weight of larger enterprises on the one hand, and the extremely high percentage of "cottage industries" (*micro-industries*) on the other hand, in terms of employment distribution. The participation of "typical" small and medium enterprises is considerably smaller in Latin America than, for example, in Japan. As in the case of agriculture, the difference in levels of productivity, wages, etc., between large units of production and smaller ones (particularly cottage industries) is quite large. In the case of the machinery industries, in particular, which have developed quite recently in Latin America, the expansion of large enterprises has not been fully accompanied by the simultaneous development of small and medium enterprises. This evolution is very different from the Japanese experience.

Research has been carried out to anlyse the causes of these particular phenomena which to a large extent are responsible for the problems of inadequate employment and unequal distribution of income. On the one hand, they are closely related with and partially explained by the so-called "initial conditions" that prevailed when "modern economic growth" was initiated, particularly the unequal distribution of land and other resources, which remains unchanged in most of Latin American countries in spite of their programmes of agrarian reform. On the other hand, however, the differential structure may have been intensified by the very process of "modern economic growth", because the modern economic sectors developed much faster than the traditional sectors in this process, and particularly by the different speeds at which technological progress was introduced into the modern and traditional sectors. Various items of empirical evidence appear to confirm this phenomenon, both in industry and agriculture.

In Latin American countries, the subsistence crops which are produced on small farms with traditional technology (and mostly consumed directly by

producers or sold in the local market) have shown the lowest growth rate of production (2.5% per annum) in comparison with food production as a whole (3.6%) and agricultural production in general (2.9%), over the period 1961-1977. It should be added that the growth rate of production of subsistence crops has been even lower than population growth (2.8%) in the same period.

Although the situation may differ from one country to another, this difference in the growth rate of production is closely related to improvements in crop yields (land productivity). In Brazil, for example, while modern crops such as sugar cane, soybeans, etc., obtained annual increases in yield of 3.8% in the period from 1961/1965 to 1974/1975 and intermediate (or transitional) crops such as corn, coffee, etc., registered a 1.7% increase, yields of traditional crops such as rice and beans decreased by 0.7%. In Mexico, the yield of maize, which is mostly produced by smaller farmers (approximately 75% of the total production) and mainly consumed by themselves the rest being sold on local markets, increased by only 1.5% during the period 1961/1965 to 1974/1975, while yields of wheat and pulses produced by larger farms increased by 5.1% and 3.1%, respectively.

The main cause of the low increase in yield for the crops which are mostly grown by small farmers may be identified as the lower levels of input utilization and technological progress among such growers. It has been confirmed that in Mexico, the level of use of high-yield seeds, fertilizers and pesticides is very low among smaller farmers in comparison to larger farmers. A matter of particular concern to us is that the percentage of dissemination of new high-yielding varieties of maize (known as the "green revolution" seeds developed by CIMMYT) was less than 10%, while the percentage for wheat was as high as 90% in 1972. The reason for this is that the hybrid corn varieties are primarily suitable for large mechanized farms, since the seeds have to be purchased every year and small farmers cannot afford them, whereas wheat is mainly grown by large farms whose land is mostly irrigated. The unfavourable relative price of biochemical inputs compared with other inputs as well as lack of resources or limited access to finance have been the factors responsible for the relatively low level of use of these inputs among smaller farms. In Brazil (State of São Paulo), for example, while the price indices of tractors have gone down by almost 50% in comparison with the prices of major crops, the price of fertilizers declined only slightly in the period from 1967 to 1978, making fertilizers more expensive than machinery.

The lower rate of technological progress in the traditional agricultural sector may have been an important factor determining the lower rate of production of subsistence crops. There has been a tendency to give higher emphasis to the improvement of technology for commercial or export crops in Latin America. In Brazil, for example, the number of agricultural experimental projects for rice and edible beans in 1961 was substantially smaller than the number of projects for wheat, sugar cane and corn. Although efforts have recently been made to improve the technology of smaller farmers, it seems tht they have not yet produced any noteworthy results.

In the case of manufacturing industry, it can be clearly observed that the increase in labour productivity of the smaller enterprises lags considerably behind that of the larger ones. In Mexico, for example, annual rates of increase of

productivity in real terms for large,[4] medium[5] and small[6] enterprises were 4.4%, 3.8% and 1.9%, respectively, in the period 1965-1975. Although it is true that industrialization signifies the replacement of low-productivity activities by more productive ones as a result of technological innovation and a process of concentration in larger units, it seems that in Latin America while large enterprises have been developing with technological progress (probably absorbing some of the workers of small and medium enterprises), this has not been accompanied by the fully simultaneous development of "typical small and medium enterprises", and therefore these smaller enterprises have not been able to absorb the personnel of cottage industries fast enough to cause a substantial diminution in the share of these industries in the employment distribution of manufacturing industry.

Analysis of Japanese experience confirms that small and medium industries, in spite of their low capital/labour ratio (i.e., their use of labour-intensive technology), can obtain a high output/capital ratio and are able to develop at a similar rate to large enterprises. Therefore, if the conditions for the simultaneous development of smaller enterprises together with large ones deteriorate, it may be asked why such technological progress as could compensate for the deterioration does not take place in smaller enterprises. It is probable that, as in the case of Mexico, a large part of the small and medium industries consists of traditional industries with limited possibilities for technological progress, at least under the prevailing institutional set-up. Nevertheless, it would be important to analyse why, then, non-traditional small and medium enterprises (such as machinery industries) have not been able to develop at the same rate as the large non-traditional industries.

Some factors analogous to those mentioned in the case of agriculture appear to have caused these phenomena. First of all, in Latin America the introduction of foreign technology was carried out rather rapidly in the last two decades, and this technology went to large-scale industries, transnational enterprises and State enterprises. In contrast, technological progress in smaller enterprises has not been facilitated by transnational enterprises or by public institutions in most of the Latin American countries. Furthermore, it is also very likely that the limited technological progress of smaller enterprises may be explained to a certain extent by the discriminatory industrial and technological policies affecting them. In Mexico, for example, it has been confirmed that these enterprises have had very limited access, compared with large enterprises, to such resources as internal and external finance, foreign exchange, technical assistance and training of workers. Moreover, in the case of manufacturing industry, the linkage of small and medium industries with large ones must also be a very important factor if the former industries are to develop simultaneously with the latter.

2. New forms of co-operation

a) *General aspects*

Bearing the above-mentioned background in mind, a global approach should be adopted for future co-operation between Latin America and Japan. Co-operation for the production, trade and transport of commodities and

manufactures could be made effective through different forms of co-operation in the fields of direct investment, technology, finance, etc.

Here, new forms of co-operation would be considered at two different levels. First, mention would be made of general aspects of co-operation concerning, in particular, trade, direct investment and technology. Second, new forms of co-operation would be discussed at more specific levels with special reference to small and medium units of production whose features were already discussed.

Concerning trade, an important target of Latin American countries is the diversification of their exports with the better access to foreign markets. Co-operation in this field could assume several forms:

1) Assistance to the public and private sectors to improve knowledge about markets, institutional aspects and possible counterparts that can help them in improving their position in the markets: chambers of trade and organizations of producers and commerce could play a role. Participation in trade fairs, organization of missions and trade promotion campaigns are useful instruments. Studies into foreign markets, particularly Japanese ones, modalities for operating in these markets and dissemination of information of these aspects among Latin American enterprises should be also important.

2) Co-operation between Japan and some of the integration processes of Latin America (such as the Andean Group and the Central American Common Market) to reinforce joint action by these countries to operate in external markets and to solve some common problems of non-traditional exports.

3) Courses and seminars for officials of the public and private sectors especially of small- and medium-sized countries in Latin America, to transmit to them relevant aspects of the knowledge necessary to operate in foreign markets, especially the Japanese. These activities can be carried on in co-operation with appropriate Latin American training and academic institutions.

As for co-operation over production, particularly through direct investment, stress should be given to the new possibilities of joint ventures, subcontracting, etc. As is well known, accumulated direct investment has grown rapidly in Latin America and the Japanese share has increased substantially. The distribution of such direct investment by economic sectors shows a strong preference for manufacturing, with lower shares in the production of commodities and public services. And within manufactures, the proportion of sectors characterized by increasing demand and modern technology such as capital goods and sophisticated intermediate goods is particularly important. Changes in the productive structures and the specialization both of Latin America and Japan that take place as a result of the development process open up new possibilities of association and complementarity on the basis of mutual benefits for the production of goods for the market of Latin America, of other developing countries and of developed countries including Japan. Thus there is

an increasing variety and quantity of arrangements between Latin America and foreign firms, such as subcontracting, joint ventures, partial arrangements concerning technology and trade, etc.

In the field of technology, co-operation can aim at the improvement of local scientific and technological capacity to select and adapt imported technology to local conditions. Apart from the arrangements that can be made between Latin America and Japanese firms, there is a possibility of developing co-operation from Japanese public and private sectors in aspects concerning:

1) Strengthening of Latin American public and private institutions for adaptation and diffusion of technology, as well as the collection of information on available technology, especially that which could be useful for small- and medium-sized Latin American firms.
2) Co-operation for the establishment and strengthening of national and regional centres for technology.
3) Co-operation to provide governments and enterprises in Latin America with better knowledge about the possibilities of using Japanese technology.
4) Technical training of personnel.
5) Technical consultancy and engineering services.

In addition to governmental organizations, Latin American entrepreneurial associations can also be the channels to assist Latin American firms in technological improvement.

b) ***Specific aspects with special reference to small and medium units of production***

Improvement of the smaller units of production in both agriculture and manufacturing should contribute to the achievment of growth of output (and eventually increase of exports or decrease of imports) as well as of equity, through increases in the income of those employed by the smaller units and in the number of employment opportunities. As is well known, the low labour productivity of subsistence agriculture not only affects the farmers engaged in it but also determines to a large extent the low level of wage rates in urban sectors. The low rate of development of small and medium enterprises creates only limited employment opportunities, obliging a large number of urban workers to remain "underemployed" either in cottage industries (*micro-industries*) or in other urban "informal sectors". Therefore, it almost goes without saying that if the Latin American countries were successful in developing efficient smaller units of production both in agriculture and industry, this would have a very favourable effect on wages, employment opportunities, and consequently on income distribution. Strengthening of small and medium enterprises would also contribute to the development of Latin American firms *vis-à-vis* transnational enterprises.

On the other hand, development of smaller units of production is important for growth of output and improvement of the trade balance, contributing to reconciling the targets of employment of manpower and

production in competitive conditions. In the case of manufacturing industry, the products of smaller industries using labour-intensive technology could contribute considerably to the export of manufactures either directly, or indirectly through larger industries or trading companies, as is observed in Japan and the newly industrialized Asian countries, to say nothing of their contribution to the domestic market. Regarding agriculture, in many countries of the region it is vitally necessary for them to increase production of subsistence food crops if they are to remain self-sufficient in food. A lower rate of increase of food production in comparison with the population growth rate would entail the substitution of exports crops by food crops for domestic consumption, or else an increase in food imports. According to FAO projections, all the countries of the region with the exception of Argentina could become net importers of grains by 1985, if the present tendency is maintained.

As regards small- and medium-sized manufacturing enterprises, it should be emphasized that their employment effects are bound to be limited if a high growth rate of the overall economy is not attained. In this sense, as was discussed in detail in chapter 1, the crucial aspect is to secure the simultaneous attainment of a high rate of growth and development of the labour-intensive sectors.

According to the analysis of the experience of Japan and other countries, the development of smaller units of production accompanied by an increase in their productivity is highly feasible. It is possible, in manufacturing industry in general and in machinery and other capital goods producing industries in particular, to take appropriate policy measures to ensure that technological and institutional innovations are introduced in small- and medium-sized industries which will enable them to develop at a similar rate to large enterprises. In the case of agriculture, in view of the very low level of yields prevailing in Latin American agriculture in comparison with other regions of the world, the potential for raising yields is high and therefore there appears to be every possibility that with the introduction of appropriate technological and institutional innovations, smaller farmers could play a major role as food suppliers to the domestic market, simultaneously increasing their labour productivity and their income.

On the basis of these considerations, possible new forms of co-operation may be summarized as follows:

In agriculture, i) technical co-operation to smaller farmers, including improvement of their organization, should be given high priority. As Japan has a long experience of intensive farming and organization of small farms such as agricultural co-operatives, it would be able to provide useful co-operation for the introduction of technological and institutional innovations on the smaller farms of Latin America. The recent efforts of Latin American agricultural institutions, which are giving increasing emphasis to the improvement of small- and medium-sized farms, could be supported and in some cases complemented by Japanese co-operation in this field. ii) Furthermore, Japan could co-operate in specific agricultural sectors which particularly benefit small and medium farmers through intensification of their farming, such as cultivation of rice, vegetables, and fruit as well as the processing of agricultural products. iii) Another field of co-operation could be basic research and study for the agricultural sciences and development of technologies for small farmers, in

which Japanese plant physiologists, plant pathologists and soil scientists could participate more, in co-operation with experts of Latin American countries in the same field who know local conditions better. iv) Japan could also co-operate with Latin American countries by providing finance for the development of agriculture, including land development and construction of infrastructure, particularly for the production of export crops. We will discuss this in detail in the following section. v) Japan could co-operate as well with Latin American countries for the processing and export of the agricultural products.

Regarding manufacturing industry, strong emphasis should be placed on co-operation that facilitates technological and institutional innovations in small and medium firms.

In the field of technical co-operation, the programme for specific areas identified as of high priority for co-operation with Japan should contemplate, among others:

1) technical co-operation with small and medium industries, particularly in the production processes most appropriate for these industries;
2) technical co-operation in fields that permit more intensive integration between enterprises of different sizes: standardization of industrial norms and specifications, quality control, etc.;
3) co-operation in the establishment of institutional arrangements, such as subcontracting systems, associations and joint activities of enterprises, etc., that permit technological progress by small and medium industries and integration among them on the one hand, and between them and large enterprises on the other, as well as expansion and diversification of exports of manufactured goods, especially of small and medium industries;
4) training of engineers and workers in order to support the above-mentioned technical co-operation: in particular, preparation of specialized group of instructors who can make multiplies effects for technological progress, even after the co-operation programme with Japan finished.

In the field of financial co-operation, higher priority should be given to finance for small and medium enterprises. Some efforts have been already made to extend financial co-operation to these enterprises in some countries of the region, and this and similar initiatives should be intensified. It is also desirable to support the construction of industrial zones for small and medium industries and the execution of other projects which directly or indirectly help to promote such enterprises.

As for co-operation in respect of trade, improvement of the competitivenss of Latin American manufactures appears to be most necessary, particularly, if they have to face severe competition from products exported to Japan by neighbouring countries, particularly the newly industrialized countries of Asia. The above-mentioned technical and financial co-operation could be effective for improving the competitiveness of Latin American products in Japanese markets. However, in addition to these basic efforts, complementary efforts should be made in the areas of marketing, adaptation of Latin American products to the Japanese market (designs and specifications appropriate to the

Japanese consumer's preferences, etc.), establishment of channels of marketing for Latin American products, and so on.

Co-operation at the private sector level could also be important. Co-operation in joint ventures between small- and medium-sized Latin American and Japanese enterprises could be a possible new formula and could be effective in providing Latin American small and medium enterprises with new technology, organizational and management know-how as well as practice in exporting manufactures.

C. NEW FORMS OF CO-OPERATION IN NATURAL RESOURCES DEVELOPMENT AND TRANSPORT

1. Characteristics of co-operation in natural resources development and transport

Co-operation between Latin America and Japan in these sectors has different characteristics from that in the sectors covered by the previous section. Its principal features would be the following:

1) Although co-operation in these sectors could help to increase output and foreign exchange earnings as well as promote diversification of economic relations in favour of Latin American countries, such sectors may not necessarily be those with the highest priority from the Latin American point of view. However, co-operation in these fields is very important from the standpoint of Japanese requirements.

2) In order that co-operation in these sectors may be beneficial for both sides, increased output with increased competitiveness in the international market or higher efficiency in transport services should be attained. In this sense, the criterion of the new forms of co-operation here should be based primarily on efficiency in production and services.

3) Nevertheless, in these sectors efforts should also be made to take into account the effects on employment and other social requirements. Here it is important to formulate new forms of co-operation that are feasible and acceptable to both sides. For example, in co-operation for the development of production of feed grains, Japan should co-operate not only in finance, which in general produces more favourable effects for large farms, but also in technology and other inputs which are not linked to size of enterprise. Increases in exports of processed materials with higher value added should be considered in the case of co-operation for export-oriented food and minerals production. Co-operation in regional development that could be undertaken as an integral part of natural resources development, including export crop production, should be another complementary element in this sense.

4) As for the development of natural resources (particularly non-renewable resources), full consideration should be given to a long-term overall development programme (particularly for industrialization) that would

be supported with the funds obtained by the export of natural resources. The very high rate of increase of extraction of oil for export, for example, is not desirable if it is not consistent with plans for industrialization and socioeconomic development of the country concerned.

5) Co-operation to promote the introduction of technological and institutional innovations is also highly relevant in these sectors. In ocean transport co-operation, for example, technological innovation such as containerization, with equal participation by both sides, could not be realized without making certain kinds of institutional adjustments or innovations.

2. Basic features of mining and new forms of co-operation

Among the different products of the mining sector, iron ore is probably the most important for economic relations between Latin America and Japan. Furthermore, the iron ore trade provides one of the best examples of a case in which the mere continuation of past trends in mutual trade would not satisfy the future requirements of both Latin America and Japan. It is also a case where the concept of simple complementarity, based on trade in raw materials from one side and manufactures from the other, cannot be applied if mutual benefit is to be attained.

The following new aspects should duly be taken into account in future natural resource development and trade:

1) Developing countries are more conscious of their legitimate interest in utilizing their resources for their economic and social development. In some countries, particularly the oil-exporting countries of Latin America, clearer direct linkages between resource development and global economic development are contemplated in their respective development plans.
2) Reflecting this awareness to a certain extent, most countries of Latin America are now developing their natural resources through governmental or semi-governmental entities under the direct guidance of the government.
3) On the other hand, as a straightforward increase in trade in resources such as oil, iron ore and non-ferrous metals is not expected as in the past, given the series of new factors in the world economy, much closer co-operation and co-ordination will be needed in order to avoid unexpected conflicts concerning volumes, prices and other aspects related to natural resources development and trade. This is where some institutional innovations could be particularly important.
4) Under these new circumstances, it is increasingly important to incorporate the wider concept of economic co-operation in natural resource development and trade.

Japan, on the other hand, has very limited natural resources in its territory, as is well known. Furthermore, in the case of iron ore, Japan has not possessed international mining companies, nor have its steel companies had the capacity to develop captive mines abroad. Japan's only means of securing iron ore imports

has been the organization of collective ore purchase arrangements by major steel producers and trading companies, and long-term ore purchase contracts. It was for this purpose that Overseas Steelmaking Materials Committee was established. So far, this approach has been generally successful in assuring a stable supply of iron ore and other steelmaking materials, but a new approach will be necessary in order to satisfy Japanese requirements in the future, given the new circumstances mentioned above.

It should be noted in this connection that, under these new circumstances, the governments of importing countries are expected to play a more active role. In the case of Japan, given the importance of the assurance of a stable supply of natural resources, including energy, the government has been giving increasingly active support to projects for foreign natural resources development and trade, especially through financing. Moreover, the elements of economic co-operation are being given a more explicit role in the projects for resources development, on the basis of a wider concept of such co-operation.

Bearing the above-mentioned facts in mind, and taking into account the past experience of joint efforts by Brazil and Japan in the development of iron ore mining and trade, the desirable new forms of economic co-operation in the mining sector, with special reference to iron ore and related fields, would be as follows:

1) Joint basic geological survey efforts to seek new reserves and studies into the possibilities of developing new mines.

2) Closer financial and technical co-operation for the development of natural resources as well as co-operation in marketing and trade.

3) Incorporation of some appropriate supplementary measures into the practice of concluding long-term contracts, in order to cope with short and medium-term demand fluctuations. The merits of fixed quantity and fixed price in the terms of contracts should basically be retained and, at the same time, measures should be taken to maximize the benefits of both the importing and the exporting countries, as well as to protect them against demand fluctuations. One measure, for example, could involve importing countries taking a certain share in equity. Another measure could be the diversification of trading partners on both sides.

4) Joint efforts for the introduction of technological and institutional innovations in the maritime transport of such bulky cargoes as iron ore and other natural resources, including specialized carriers and ore-oil carriers, new ocean transport routes, large-scale ports and facilities, etc. Here, the possibilities of increasing the resources of the newly industrializing countries of Asia should be fully taken into account. It is also important to consider the feasibility of rather small- or medium-scale mines whose development could be facilitated if such bottlenecks as those in port loading facilities and other aspects of the infrastructure were resolved. The scope for co-operation to maximize mutual benefits appears to be great in the field of overland transportation, loading and maritime transportation.

5) Greater emphasis on regional development connected with mining development. Among others, the additional effects of railway systems, highways and port facilities on the development of the region should be evaluated. Although the mining of, for example, iron ore for export must operate efficiently with the use of modern technology in order to be an internationally competitive export industry, mining activities should not form just an enclave in the national or regional economy. Ore processing, as well as related activities including eventual steelmaking and processing of steel products, can produce significant indirect effects if adequate measures are adopted. This is precisely where the effects of new forms of co-operation based on the introduction of suitable technological and institutional arrangements can be expected. Both the Japanese Government and enterprises in related industries and trading sectors could participate actively in this kind of co-operation. Japan has a good deal of experience in carrying out co-operation of this type through new institutional frameworks.

6) Co-operation in efforts to increase the value added of the natural resources to be exported, through pelletizing, for example. It would also be important to carry out technical co-operation on the treatment of ores containing impurities such as sulphur and phosphorus as environmental regulations become stricter. Co-operation in the construction of steel plants would be the most advanced form of co-operation in this field. Japanese experience in Latin America and elsewhere has demonstrated the high effectiveness of such co-operation in respect of steel plants for the national economy and industrialization of the country concerned.

3. Basic features of maritime transport and new forms of co-operation

Maritime transport is another important sector where the simple continuation of past relationships would not necessarily satisfy the changing requirements of both Latin America and Japan. Here again, a set of new forms of co-operation with special emphasis on technological and institutional innovations could produce mutual benefits on both sides.

The following recent factors explain the reasons for the above-mentioned aspects and should be fully taken into account for the future development or maritime transport between Latin America and Japan.

1) The rapid expansion of volume and diversification of mutual trade between Latin America and Japan which is taking place will necessarily call for certain technological and institutional adjustments to maritime transport in order to face it.

2) In particular, new technology should be introduced to improve the efficiency and quality of transport services. As is well known, the development of new technologies has been particularly intensive in the last two decades, but ocean transport between Latin America and Japan

has not been able to take full advantage of these developments. When geographical distance and the recent hike in oil prices are taken into account, the introduction of new technology is crucial for obtaining the efficiency and lower cost of transport necessary for the further expansion of mutual trade.

3) The Latin American countries are increasingly interested in participating in maritime transport activity, which is reflected in various aspects of their ocean transport policy such as their assignment of priority to ships flying their own national flags, etc.

New forms of co-operation in maritime transport should be studied, bearing these basic points in mind. However, the present situation as regards transport has special characteristics that make the straightforward introduction of new technologies difficult. Therefore, as mentioned later, a step-by-step approach to co-operation in maritime transport should be adopted.

Maritime transport between Japan and Latin America, particularly regarding the Andean countries and Brazil, has the following particular characteristics:

With respect to the volume and types of cargoes, i) there are big differences in the types of goods exported and imported from the maritime standpoint (the tonnage of bulky cargoes exported to Japan from Latin America amounts to 13.2 times as much as those imported into the region, although as regards general cargo the amounts of exports and imports are about the same); ii) because of the long distance, the amounts of maritime transport expressed on a ton-mile basis are about double those corresponding to the average level.

Regarding present maritime transport technology, most of the ships used for the outward voyage from Japan are of conventional multi-purpose liner type. Although the number of containers handled by these ships is increasing rapidly, there are neither full container ships in service, nor LASH or RO/RO ships, nor special ships to carry wood on the routes between Japan and the west coast of South America and Brazil.

The outlook for future trends of mutual trade in terms of cargoes, however, implies the necessity to introduce certain technological and institutional innovations. The following future trends may be assumed: i) imports of bulk materials from South America will continue, and among other aspects an increase in imports of iron ore from Brazil and grain from Brazil and Argentina is expected; ii) an increase in imports of wood and chips from some Andean countries and Brazil is expected; iii) an increase in general cargo, particularly from Japan, is very likely, while the export of automobiles from Japan to Andean countries is expected to decrease.

Bearing in mind the technology now available and the above-mentioned tendencies in mutual trade, the ideal types of ships which should be introduced from a long-term standpoint are the following. For the outward voyage from Japan to South America: i) car carriers for automobiles and steel, ii) ships to carry heavy cargo such as industrial plant (conventional-type ships with heavy derricks), and iii) full container ships for containerizable cargo. For the homeward journey from South America to Japan: i) large-scale combined cargo ships for bulk materials such as iron ore and grain, ii) timber-carrying ships and

other special cargo ships for materials with a particular shape such as timber and chips, and iii) full container ships for other general cargoes which can be containerized.

Considering the above-mentioned facts, as well as detailed studies into the prerequisites for containerization and the possibilities of introducing combined large-scale cargo ships mentioned in chapter 5, part two of this report, the following fields and forms of co-operation between Latin America and Japan in maritime transport could be suggested:

1) In the field of shipping: exchange of information (through seminars, for example), preparation of specialists, and joint research and study on the possibilities of introducing various technological and institutional innovations such as large-scale combined cargo ship for iron ore and grains, full container ships, etc., would be highly important. The joint services and technical co-operation could be considered with due account being taken of past experience in this field.

2) In the field of shipbuilding, financial and technical co-operation between Japan and Latin America has already been undertaken. Co-operation at the private sector level, such as joint ventures, could also be developed in respect of the design and construction of such ships as conventional and multi-purpose vessels. In this field, the appropriate forms of co-operation should be different according to the level of development of shipbuilding in each country (for example, Brazil already has a high level of shipbuilding capacity for large vessels).

3) With respect to containerization, co-operation between both sides in the software and hardware fields should be carried out through a stepwise approach such as the following, for the reasons already mentioned: a) in the *preparatory stage*, efforts should be made to expand the current tie-ups between Latin American and Japanese shipping companies, preparing for future joint services with full container ships. In this process a consensus should gradually be formed regarding the concepts relating to the future system of maritime transport between Latin America and Japan; b) in the *transitional stage*, conventional ships would be grdually replaced by RO/RO and container ships, while items which can be handled only by conventional ships, such as heavy industrial plants, would be transported by these ships. This process should be accompanied by a gradual increase in the construction of feeder ships and of port facilities for containers, etc., as well as progress in institutional arrangements suitable for full container systems; c) in the *final stage*, a new co-operation scheme for full container systems should be established. In all these stages, Japan should co-operate in the construction of container terminals, provision of means for continued transport from these terminals to the feeder service ports and from there to final destinations, as well as in a number of technical co-operation activities for full container terminal operations, container inventory control, etc.

4) Co-operation in other related areas of maritime transport will be indispensable for successful co-operation in this field. This includes

construction of the necessary infrastructure (port facilities, cargo handling machine, etc.) and improvement in port operations, packing techniques, container repairing, etc. Inland transport routes from local production sites to the ports should be improved to reduce land transport costs, through such projects as export corridors, integrated transport systems, etc.

D. FINAL REMARKS: OBSERVATIONS ON SOME OTHER ASPECTS RELATED WITH ECONOMIC CO-OPERATION

The study contained in this report does not cover all aspects of economic relations and economic co-operation between Latin American countries and Japan, and there may be some important aspects which are not covered here. The specific aspect of financial co-operation could be an example, although studies of all sectors included in this report refer explicitly to the financial co-operation relating to the respective sector. Specific aspects of finance and other fields which are not covered fully in this report are analysed in other studies.[7]

Another important aspect relating to economic co-operation is the problem of the trade imbalance between Latin America and Japan. First of all, it is obvious that Japan must make an effort to improve the conditions of access to Japanese markets for goods of interest to Latin American producers. This problem should be solved fundamentally by the expansion of Latin American exports to Japan.

Nevertheless, the increase of the international competitiveness of Latin American exports, as well as an increase in the output destined for export are very important, too. These efforts of the Latin American countries could be supported by the new forms of co-operation mentioned in sections 2 and 3 of this chapter, particularly those emphasizing the introduction of technological and institutional innovations. For example, as regards the export of manufactures, it is vital for these countries to sufficiently improve their overall industrial efficiency through such co-operation to compete with the manufactures exported by the newly industrializing countries of Asia to the Japanese market. It is also important to co-operate in the field of marketing and in the establishment of marketing channels in Japan, because Latin American exporters are not well acquainted with the characteristics of Japanese markets, especially the preferences of Japanese customers, marketing systems in Japan, etc.

Finally, it is also highly important to establish an efficient system for the exchange of information relating to mutual economic relations, as well as some kind of forum for the exchange of ideas and consultations on the effective development of economic co-operation in the various new forms discussed here or in any other forms.

E. CONCLUDING SUGGESTIONS FOR POSSIBLE DIRECTION OF FOLLOW-UP ON THE REPORT

1. The report is of a general nature in the sense that it deals not with the problems of individual countries in Latin America, which are, after all, directly concerned with and responsible for making policy decisions relevant to the suggestions and indications mentioned in the report with respect to promoting economic co-operation between the respective country and Japan. Therefore, we believe it is highly desirable to create opportunities for the major contents of the report to be discussed and appraised by experts and policy-makers of the individual countries of the region together with their Japanese counterparts. For this purpose, for example, a regional seminar of moderate size may be most feasible. It may be worthwhile to add that an important reason underlies this suggestion. As mentioned in the report, possible new forms of economic co-operation for the future can effectively be pursued only when these are considered inseparably from the development strategy of each individual country in long-term perspective. This would require further efforts in bilateral research co-operation between the country concerned and Japan.

Action in specific directions can be taken only after an opportunity, as mentioned above, has been taken up. However, it may not be out of place to indicate specifically the following two points.

2. The common characteristics of economic structures and strategies of development, beyond the problems of individual countries, are discussed in the report, but these have not necessarily been extended to the aspect of "integration" of the region. It is important to note here that new forms of economic co-operation with Japan are highly relevant to this regional problem in particular viewed from the aspect of the newly-industrializing process. Relatively advanced countries in the region will further promote economic co-operation with the less advanced countries in the future along the trends of the recent past. Japan's economic co-operation in various areas, in particular, capital investment and technology transfer, with semi-industrialized countries in the region, we expect, should better be considered in closer relationship to the regional development mentioned above. This is to search for promoting and intensifying "international linkages" of economic co-operation beyond narrow frame of donor versus recipient country. The following suggestion may be illustrative of the wide implications involved in this approach. Transfer of highly sophisticated technologies will continue to be the major area of technology co-operation through the latter channel, while, diffusion of less sophisticated technologies will be a more appropriate area of the first channel. It goes without saying that such "division of labour" should not be considered too mechanical. What is suggested here is that there is an important aspect of new forms of economic co-operation which can make effective linkages between bilateral routes and regional integration, beyond the scope of what has been suggested for individual countries in 1) above.

3. Finally, we would like to suggest one idea which pertains to what has been mentioned in 2) above. A special expert study group, consisting of several members from Latin America and Japan, should be organized in order to explore

the feasibility conditions of promoting technology training activities, in particular, towards establishing technology training institutes in semi-industrialized countries in Latin America. Illustrative suggestions can be something like the following: Japan will provide both capital equipment and high level technical expert services in order to train technical personnel from the Latin American countries, who are expected to serve in those countries as instructors in local training activities and/or serve as technicians directly in production activities, both private and public. The country where such institutes shall be located will make financial contribution in the form of, say, all current costs. The problems such as selection of areas of technology most appropriate and feasible should be an important issue for discussion by the experts group. However, it is suggested that the areas to be specified may quite probably be along the broad lines indicated in the analysis of the report.

Part Two

Chapter 1

INDUSTRIAL STRATEGY AND NEW FORMS OF CO-OPERATION

Introduction

A study into new forms of co-operation between Latin America and Japan in the field of industry and trade, should take into account the following basic aspects that characterize the present phase of development of Latin America.

First, Latin American countries are implementing a new strategy of trade and industrial development, whose main features are: higher priority to export-diversification and export-oriented industrialization based on more open external policies that are implemented together with the advanced import-substitution industrialization. Under this strategy, Latin American manufacturing industries are at present required to attain the following goals:[8]

1) To shift the production structure towards manufacturing capital goods and more sophisticated intermediate goods, in order that the technological input-output linkages, internal relations and those with other sectors generate dynamic effects through demand for intermediate and capital goods originating in the manufacture of final consumption goods.

2) To diversify exports by incorporating manufactures in order to participate actively in the most dynamic flows of international trade so as to contribute to the solution of the chronic tendency towards an external bottleneck.

3) To establish efficient and competitive production structure through rationalization of protection, avoiding excesses, in order to increase the international competitiveness of manufactures.

4) To contribute to the creation of employment opportunities, through changes ensuring multiplier effects on employment.

The simultaneous accomplishment of the four goals is not an easy task. In particular it is highly important to search for a consistent and feasible development strategy that assures their attainment. However, Japanese experiences of economic development and trade seem to suggest the possibility of accomplishing them simultaneously. On the other hand full consideration

should be given to special aspects of Latin America, some of them favourable and others unfavourable: availability of abundant resources, high rate of increase of labour force, etc.

The purpose of this chapter is to analyse the possibility of industrialization at the semi-industrial phase that ensures a higher rate of increase of employment and export of manufactures, with special reference to Japanese experience, particularly regarding the small and medium enterprises.

The author believes that this analysis should be useful to examine the possibility of introducing, through appropriate policy measures, such technological and institutional innovations in Latin American manufacturing industries, particularly of small and medium size, that enable them the attainment of the four goals, and to search for new forms of co-operation between Latin America and Japan.

A. STRATEGY FOR LABOUR ABSORBING AND EXPORT-ORIENTED INDUSTRIALIZATION AT SEMI-INDUSTRIALIZED PHASE

1. Industrialization in Latin America and its effects on employment and export

a) *General remarks*

Studies by ECLAC and other authors[9] analysed the pattern of industrialization in Latin America and its effects on the domestic economy and foreign trade of the countries of the region. Some of the relevant conclusions of these studies are:

1) The direct contribution of the manufacturing sector to the solution of the serious problem of employment in Latin America does not appear to be very great. Although industry provided employment, it did not keep pace with the increase in urban population.

2) As regards export of manufactures, it is found that in the long term, the process of industrialization has not been accompanied by proportional increase of export of manufactures, particularly in comparison with Asian newly industrializing countries.

With regard to the first point an important finding was presented in Part One, Chapter One: the rate of increase of industrial employment in Latin America during the last two decades was considerably lower than the rate of some semi-industrialized countries of Asia. And what seems very important here is the fact that this happened in spite of the very high rate of increase of population, of labour force and of urbanization in Latin America. As it is well known, the rate of underutilization of labour (open unemployment and underemployment) is extremely high in the region —approximately one-fourth of the total labour force according to ECLAC estimates.[10]

Japanese experience appears to be relevant in this context, because Japan has been rather successful in accomplishing the already mentioned four goals precisely during the period of industrialization that enabled her to shift from semi-industrialized phase to fully industrialized phase. And it is important to note that in the entire process of industrialization of Japan, including this particular phase, small and medium-scale enterprises played a significant role, making important contributions to the employment of labour and export of manufactures, because they have been normally much more labour intensive than larger ones and have attained high capacity of competition in the world market.

In this sense, it would be important to assess the situation of small and medium-sized enterprises in Latin America as well as their contribution to employment and exports, particularly in the light of Japanese experience. This analysis could elucidate some of the key elements that could at least partially explain the limited impact of industrialization in Latin America on employment and exports as discussed above. In other words, this analysis would make clear to what extent and how smaller enterprises were discouraged in Latin America, affecting the distribution's employment and the employment capacity of manufacturing industry in general (discussed in section 1) and of heavy and chemical industries in particular (discussed in section 2) as well as the capacity to export manufactured goods (discussed in section 3).

b) *Comparison of distribution of employment by size of establishment in Latin America and Japan*

Distribution of employment among enterprises of different size in Latin American manufacturing industry differs considerably from that of Japan. First, comparison is made, in respect of enterprises with more than five persons (four persons in case of Japan). Other enterprises are excluded here, partly for statistical reasons, but we will discuss later on these enterprises.

As shown in table 1, the proportion of persons employed in the group of small enterprises (5 to 49 persons per establishment; in the case of Japan, 4 to 49 persons) is considerably smaller in Latin American countries than in Japan. While in most Latin American countries, about 30% of all those employed in the manufacturing industry corresponds to this group of enterprises (30% in Brazil, 1970, 21% in Mexico, 1970, 26% in Colombia, 1970, 34% in Chile, 1967, and 29% in Argentina, 1954), in Japan about 40% or more (45% in 1955) corresponded to this group in the period between 1955 to 1965.

Even if fairly large enterprises (those with 50 persons) are included in this group, the higher concentration of labour in the smaller enterprises in Japan compared with Latin America does not change. While in Japan, 50% or more of all persons employed in manufacturing industry corresponds to enterprises with less than 100 employees, in Latin America 34 to 42% (depending on the country) corresponds to these enterprises.

Another important difference between distribution of employment by size of firm between Japan and Latin American countries is that the percentage of those occupied in large enterprises (250 persons or more) is much larger in the latter countries than in Japan. As is shown in table 2 persons employed in large

Table 1

LATIN AMERICA: DISTRIBUTION OF PERSONS EMPLOYED IN MANUFACTURING INDUSTRIES

		Number of persons per establishment					Absolute number (100 persons)
		5-19	20-49	50-99	100 and over	Total	
		Percentage					
Argentina*	(1954 Census)	16[a]	13[b]	13	58	100	
Brazil*	(1959 Census)	16	12	11	71	100	1 644
Brazil	(1970 Census)	16	14	12	58	100	2 428
Brazil	(1974 "Pesquisa")	10	12	13	65	100	3 374
Mexico*	(1961 Census)	11[c]	22[d]		67	100	824
Mexico	(1970 Census)[e]	12[c]	9[f]	13[g]	66	100	1 382
Colombia*	(1960 "Encuesta")	19	15	12	54	100	245
Colombia	(1965 "Encuesta")	19	14	12	61	100	283
Colombia	(1970 Census)	12	14	13	61	100	346
Colombia	(1975 "Encuesta")	7	14	13	66	100	456
Chile*	(1957 Census)	15	15	12	58	100	207
Chile	(1967 Census)	18	16	13	54	100	353
Central America*	(1962 "Encuesta")	26	21	16	37	100	150
Guatemala	(1964 Census)	15	19	19	45	100	38
Paraguay*	(1963 Census)	43	16	11	30	100	24
United States	(1954 Census)	6	9	10	75	100	15 393
Japan	1955	26[h]	19	11	44	100	4 958
Japan	1960	20[h]	18	12	50	100	7 602
Japan	1965	23[h]	16	12	49	100	9 481

Source: For those data with asterisk: ECLAC, "Small-scale industry in the development of Latin America", *Economic Bulletin for Latin America*, May 1967; for those data without asterisk: calculated directly from Industrial Census and "Encuesta" or "Pesquisa" (sample surveys).

[a] From 11 to 25 persons employed. [b] From 26 to 50 persons employed. [c] From 6 to 25 persons employed. [d] From 26 to 100 persons employed.
[e] Includes mining. [f] From 26 to 50 persons employed. [g] From 51 to 100 persons employed. [h] From 4 to 19 persons employed.

Table 2

CHANGE OF DISTRIBUTION OF EMPLOYMENT IN MANUFACTURING INDUSTRIES

(Percentage)

	Small[a] (5-49)	Medium[b] (50-249)	Large[c] (250 and over)	(Of which 500 and over)	Total	Absolute number (1 000 persons)
Brazil						
1959	27.8	25.0	44.6	(30.5)	100.0	(1 644)
1970	29.2	29.8	41.0	(26.1)	100.0	(3 351)
1974	22.4	32.9	44.7	(27.1)	100.0	(3 291)
Mexico						
1965	24.1	34.3	41.6	(25.5)	100.0	(1 116)
1970	21.4	34.0	44.5	(27.6)	100.0	(1 326)
1975	20.6	30.6	48.8	(32.1)	100.0	(1 508)
Japan						
1955	45.1	22.3	32.6	(23.8)	100.0	(4 958)
1960	39.1	25.3	35.5	(26.1)	100.0	(7 601)
1965	39.2	25.4	35.4	(25.5)	100.0	(9 481)
1970	37.8	25.2	37.0	(27.2)	100.0	(11 164)
1975	41.2	24.9	33.8	(24.8)	100.0	(10 663)
Colombia						
1965	32.5	24.7	42.7		100.0	(284)
1975	20.6	29.0	50.4		100.0	(456)
Peru						
1963	29.7	29.3	40.1		100.0	
1973	26.6	27.1	44.3			

Source: Brazil and Colombia: calculated from Industrial Census. Mexico: PREALC, *Diferencias de Remuneraciones y Coexistencia de Establecimientos de Distinto Tamaño: México 1965-1975*, September 1978, Santiago. Peru: Haro, Rodolfo and Gunilla Ryd, "Notas sobre el Desarrollo, la política industrial y las condiciones de coexistencia de la pequeña, mediana y la gran industria en Perú 1963-1973" (draft).

[a] 1-49 for Japan, 6-49 for Mexico. [b] 50-199 for Colombia and Peru. [c] 200 and over for Colombia and Peru.

enterprises represent around 44% in Mexico and Brazil in comparison with around 35% in Japan. This means that the smaller proportion of persons occupied in small enterprises (5 to 49 persons) in Latin America as discussed above is counterbalanced both by medium and large enterprises, and particularly by the large ones.

One of the possible reasons for these differences between Latin America and Japan could be that the cottage industries (commonly called "microindustrias" in Latin America; for the purposes of our study we shall consider those establishments with five employees or less to be "cottage industries") are more dominant in Latin America than in Japan and the typical small-medium enterprises have not developed to the same extent as in Japan. There are various evidences that confirm this possibility.

Table 3

MANUFACTURING INDUSTRY, BY SIZE, AND BY GROUPS OF COUNTRIES, 1960

	Employment in "micro industrias" (cottage industry)	Employment in manufacturing industry, by size (number of persons employed per establishment)				Total	Total in absolute number (1 000 persons)
		5-19	20-49	50-99	100 and over		
Group I							
Argentina	42.0	9.2	7.6	7.6	33.6	100.0	1 720
Brazil	43.9	9.0	6.7	6.2	34.2	100.0	2 850
Mexico	35.7	10.3	7.7	7.7	38.6	100.0	1 556
Subtotal	41.3	9.4	7.2	6.9	35.2	100.0	6 126
Group II							
Chile	46.2	8.1	8.1	6.5	31.1	100.0	447
Colombia	66.3	6.4	5.1	4.0	18.2	100.0	748
Peru	61.5	8.8	6.2	4.3	19.2	100.0	536
Uruguay	28.8	16.6	11.2	7.8	35.6	100.0	205
Venezuela	40.0	21.7	11.5	4.1	22.7	100.0	295
Subtotal	54.2	10.3	7.4	4.9	23.2	100.0	2 231
Group III							
Subtotal	74.8	7.8	4.9	3.7	8.8	100.0	987
Total	**47.9**	**9.4**	**7.0**	**6.1**	**29.5**	100.0	9 344

Source: ECLAC, "Small-scale Industry in the Development of Latin America," *Economic Bulletin for Latin America*, May 1967.

Industrial censuses should be used to examine this possibility. Nevertheless, industrial censuses in Latin America in many instances omit cottage industries or give them limited coverage. For example, in Mexico, where according to the census, enterprises of smallest size (one to four persons including self-employed persons) absorbed 19.4% of the industrial labour force in 1960, it was estimated by ECLAC that cottage industries absorbed 35.7% of the labour force in the same year[11] (see table 3). Another study estimated that enterprises with 1-5 persons absorbed 40.1%, 41.2% and 41.7% of the labour force in manufacturing industry in 1965, 1970 and 1975, respectively.[12]

As for Brazil, the difference between the number of persons employed in enterprises of six persons or more covered by the Industrial Census and the total number of persons occupied by the manufacturing industry covered by the Demographic Census gives us a very rough estimate of the number of persons occupied by cottage industries as being in the order of 27.5% in 1970. This same method gives us the figure of 35.7% for 1976 and 18.1% for 1960, while ECLAC's estimate for the latter year is 43.9%.[13]

In the case of Colombia the number of persons employed by "handicraft manufacturing" amounted to 51% of the total number of persons occupied in manufacturing industry in 1970 according to an ILO study,[14] while the ECLAC study already quoted estimated 66.3% for 1960. With respect to Chile, Tokman estimated that 32.3% of the total labour force of manufacturing industry was occupied by the "informal" manufacturing industry in 1967, while the study of ECLAC estimated 46.2% for 1960.[15] Regarding Peru, Fitzgerard estimated that 66.4% of the labour force in manufacturing industry was employed by "informal" cottage industries around 1968 (before reforms),[16] while the ECLAC study estimated 61.5% for 1960.

In Japan, the proportion of the labour force occupied by cottage industries diminished from 34.5% in 1955 to 19.7% in 1960 and since then this percentage has remained almost unchanged (17.6% in 1965, 19.0% in 1970 and 20.7% in 1975).[17]

A certain number of data allow a limited analysis of the trend in the distribution of employment by size of enterprises in Latin America. As far as enterprises with five persons and over are concerned, in four of the five countries for which data was available over time, labour employed by larger enterprises (employing more than 200 persons in the case of Colombia and Peru) increased at a higher rate than labour employed by small and medium enterprises as shown in table 2.

Lower rates of increase in the number of persons employed by small and medium enterprises are particularly pronounced in the case of Mexico. In the period 1965-1975, the participation of small- and medium-scale enterprises (6 to 250 persons) in the total number of persons employed in the manufacturing industry decreased from 58.4% to 51.2% while the number of employees in large enterprises (with 500 persons or more) increased from 25.5% to 32.7%. It is important to note that among smaller enterprises, the decrease in the share was most pronounced for the group with 16-50 employees and for the group with 51-100 employees.

Lower rates of increase in the number of persons employed by small enterprises are also pronounced in the case of Colombia, as is shown in table 5. It

is important to note that the increase in the share of large enterprise in employment in Colombia was much more pronounced in the period of accelerated industrial development (1967-1974) than in the period of moderate development (1959-1967).[18]

In Brazil, the participation of smaller enterprises (5-49) in the distribution of employment increased slightly in the period 1960-1970, but it decreased drastically in the period 1970-1974 from 29 to 22%. Medium-scale enterprises continued increasing throughout this whole period.

Table 4

MEXICO: EMPLOYMENT AND VALUE-ADDED OF MANUFACTURING INDUSTRY BY SIZE OF ESTABLISHMENT

Size of establishment	Distribution by size of establishment					
	Value added			Employment		
	1965	1970	1975	1965	1970	1975
6 - 15	4.6	3.7	3.3	8.5	7.4	9.1
16 - 50	11.8	9.8	7.1	15.6	14.0	11.5
51 - 100	11.0	10.2	9.4	13.0	12.7	11.4
101 - 250	21.4	22.0	18.0	21.3	21.3	19.2
251 - 500	17.5	18.1	19.3	16.1	16.9	16.1
501 and over	33.8	36.3	42.8	25.5	27.6	32.7
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: PREALC, *Diferenciales de Remuneraciones y Coexistencia de Establecimientos de Distinto Tamaño: México 1965-1975*, Santiago, 1978.

Table 5

MEXICO: INCREASE OF LABOUR PRODUCTIVITY AND WAGE BY SIZE OF ESTABLISHMENT, 1965-1975

	Small enterprises (6-51)	Medium enterprises (51-250)	Large enterprises (251 and over)
Average productivity in 1965 (thousands of 1965 pesos)	23.3	32.3	42.3
Annual real rate of increase of productivity 1965-1975	1.9	3.8	4.4
Average wage rate 1965 (thousands of 1965 pesos)	10.5	15.2	19.3
Annual real rate of increase of wage rate	1.9	3.3	4.05

Source: PREALC, *Diferenciales de . . . . op. cit.*

According to the above data, the major characteristics of the distribution of employment in manufacturig industries in Latin American countries seems to be:

1) The participation of typical small- (and in some cases medium-sized) enterprises in the distribution of employment is considerably lower in Latin America than that in Japan. Furthermore, in some of the main countries of the region small- and medium-sized enterprises have failed to increase their number of employees at the rate of the larger enterprises.

2) In contrast, cottage industries seem to absorb a substantial part of industrial labour force in Latin America, although exact data concerning these industries are not available.

3) Consequently, if cottage industries are excluded from the analysis of the distribution of employment by scale, a relatively high proportion of the labour force is employed by large-scale enterprises.

These characteristics of manufacturing industry in Latin America should be closely related with the specific process of industrialization in the region and might suggest that, in the process, simultaneous development of enterprises of large and small-medium-size has not been so pronounced as in Japan and a considerable number of persons remained engaged in cottage industries.

c) ***Observations on conditions of co-existence and simultaneous development of small-medium and large enterprises***

As discussed above, the participation of small and medium enterprises in Latin American countries in the total employment of manufacturing industry is considerably lower than in Japan and, in some of the main countries of the region, small- and medium-sized enterprises have failed to increase their number of employees at the rate of the larger enterprises.

Therefore, the crucial point is to determine how in Japan small- and medium-scale enterprises could coexist and develop simultaneously with large ones. The M-S Research Project of the International Development Center of Japan analysed this aspect and came to some significant conclusion regarding the requirements of this simultaneous development.[19]

In this study it is assumed that "a prime condition for co-existence of both small-medium scale enterprises (SSE) and large scale enterprises (LSE) is a state of equal return on capital". And if the SSE is defined as being relatively a labour-intensive enterprise (i.e., the relative share of labour is higher in SSE than in LSE), the requirement for the coexistence of SSE with LSE is that wage differentials by scale be higher than those of labour productivity by scale and that these be still higher than the differentials in the capital-labour ratio by scale.[20]

In case of Japanese manufacturing industry, the following systematic tendencies were observed in enterprises with more than twenty workers:

1) Smaller scale enterprises have higher capital productivity (output-capital ratio) than larger scale enterprises; and

2) Wage differentials by scale are lower than those found in labour productivity by scale, which are still smaller than the difference in the capital-labour ratio by scale.

On the basis of these observations, the following interpretation is possible:

1) In an economy where wage differentials exist, there is a possibility for small-scale enterprises (SSE), despite their lower labour productivity, to coexist with large scale enterprises (LSE) as long as the former choose a relatively labour-intensive technology and achieve a higher output-capital ratio than the latter; and
2) In an economy where no wage differentials exist, it is also possible for SSEs to coexist with LSEs as in case 1). The capital productivity of the former must also be higher than the latter. This implies that wage differentials (lower wages in SSEs) are less significant than technology.

Now the tendencies observed regarding the coexistence and simultaneous development of small and medium-scale enterprises with large enterprises in Latin America discussed in the previous part of this chapter could be explained at least partly by investigating to what extent the requirements for simultaneous development mentioned above are satisfied in these countries. Unfortunately, limited data are available for this kind of investigation, especially because data concerning capital (or horsepower) are normally lacking in the industrial censuses of Latin American countries. Regarding countries for which data are available the following observations were obtained.

1) In general terms normal type downward curves of both output-capital ratio and relative share of labour are found for Brazil and Mexico[21] although the curves are not so systematically downwards as in the case of Japan (compare figures 1 and 2 corresponding to Japan and figures 3, 4 and 5 corresponding to Mexico and Brazil).
2) Irregularities, sometimes very pronounced, are observed in the cases of Chile, Peru,[22] Costa Rica,[23] and Colombia[24] with respect to the curves of output-capital ratio and relative share of labour (see tables in appendix).
3) In general terms differentials of wage, labour productivity and capital-labour ratio by scale appear to follow normal upward curves in such a way as to satisfy the requirements for the coexistence of small and medium enterprises with large ones, although the curves are sometimes not so systematic and pronounced as in the case of Japan and show some irregularities, for all countries for which data are available except Colombia (Brazil, Mexico, Peru and Costa Rica) (see tables in appendix).

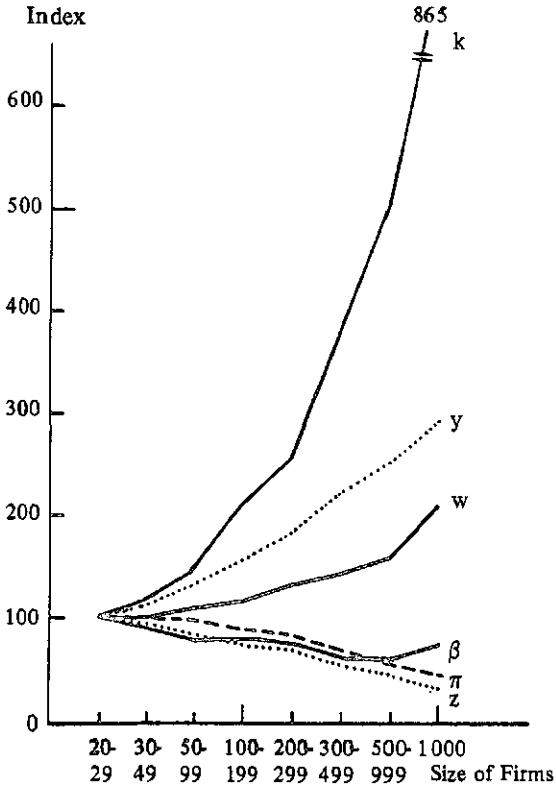
These findings can be tentatively interpreted as follows:

First, in the case of Mexico, the irregularities observed in the curve of output-capital ratio for certain segments of small or medium enterprises (or most "typical" small and medium ones) may be partially explained by the particular nature of the industrial structure of Mexico: a large percentage of

Figure 1

JAPAN, 1957

OUTPUT-LABOUR RATIO (k), LABOUR PRODUCTIVITY (y), WAGE (w) OUTPUT-CAPITAL RATIO (z) RELATIVE SHARE OF LABOUR (β) AND RATE OF RETURN ON CAPITAL (π)



Source: Tajima, Mutsuo, "Small-Medium Scale Manufacturing Industry: Further Discussion in a Comparative Study of Japan and Developing Countries", *IDCJ, Working Paper Series No. A-08,* 1978.

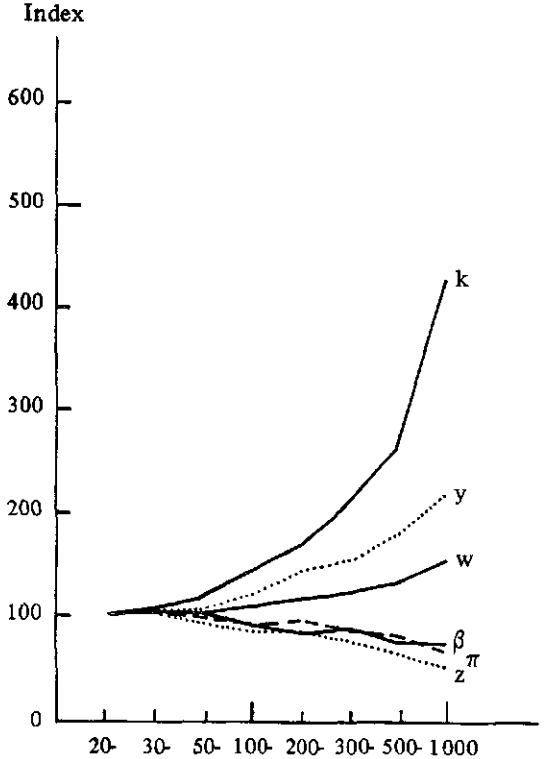
small and medium enterprises belong to the so-called traditional industries. According to a PREALC study[25] approximately 75% of employees in enterprises of 15 to 50 persons belong to the typical traditional industries such as textile, clothes, shoes, non-metal mineral products, furniture, etc., whose capacity to raise productivity is limited because of their organization and technology.

Second, irregularities, sometimes extreme ones found in the case of smaller countries such as Peru, Colombia, Chile and Costa Rica, could have been originated partially from the heterogeneity which often takes place in the

Figure 2

JAPAN, 1966

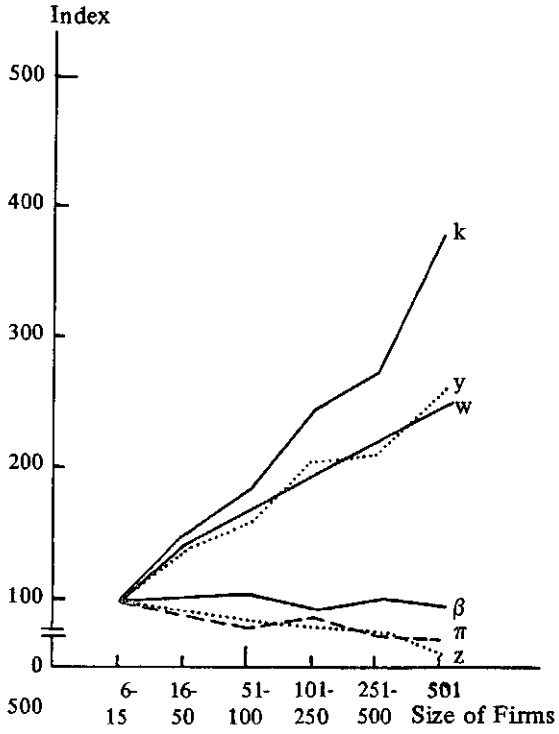
OUTPUT-LABOUR RATIO (k), LABOUR PRODUCTIVITY (y), WAGE (w), OUTPUT-CAPITAL RATIO (z) RELATIVE SHARE OF LABOUR (β) AND RATE OF RETURN ON CAPITAL (π)



Source: Tajima, Mutsuo, "Small-Medium Scale Manufacturing Industry: Further Discussion in a Comparative Study of Japan and Developing Countries", *IDCJ, Working Paper Series No. A-08,* 1978.

Figure 3

MEXICO, 1970

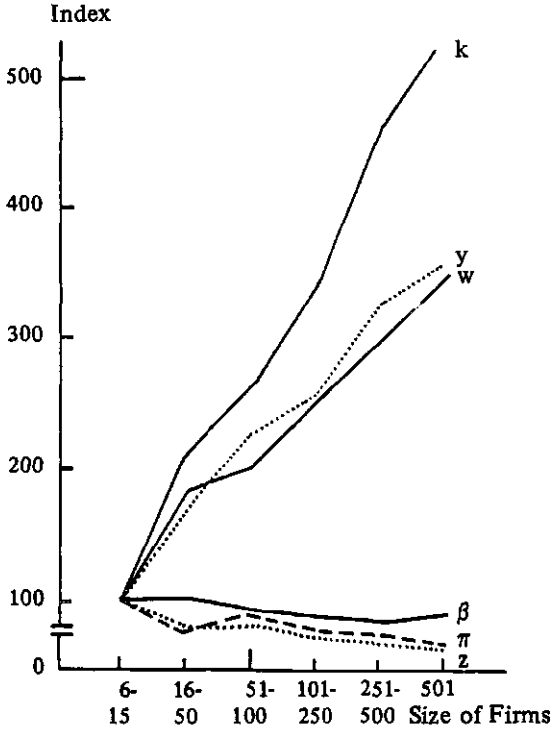


Source: PREALC, *Diferenciales de Remuneración y Coexistencia de Establecimientos de Distinto Tamaño: México 1965-1975*, 1978.

process of industrialization in developing countries in general, and conspicuously in smaller countries. For example, irregularities in Chile could be explained partly by the presence of the very capital-intensive, but not necessarily very efficient large scale enterprises such as copper refining plants and a blast furnace steel plant of this country. When these enterprises are excluded from the census data, irregularities diminish, although do not disappear completely. It should be remembered also that a number of medium and large scale State owned enterprises could affect the form of curves in case of Peru. On the other hand the structure of industry similar to the Mexican case where a large percentage of traditional industries with very low level of technology is concentrated in the small industries could be common to other countries of Latin America.

Figure 4

MEXICO, 1975



Source: PREALC, *Diferenciales de Remuneración y Coexistencia de Establecimientos de Distinto Tamaño: México 1965-1975*, 1978.

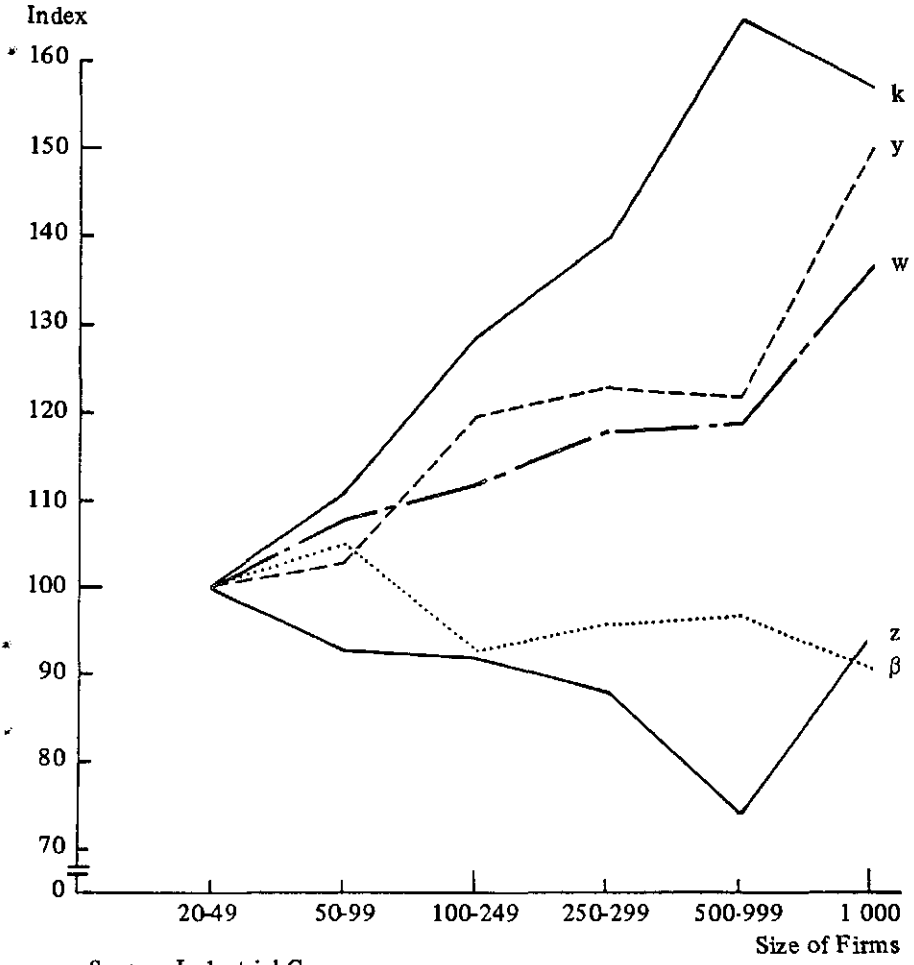
d) ***Conditions of simultaneous development and their implications***

A detailed analysis was made with respect to the Mexican manufacturing industry on the basis of the adjusted census data for 1970 and 1975, and a series of important conclusions were obtained,[26] which appear to be confirmed by preliminary studies of Colombia, Peru and Costa Rica.

In the case of Mexico, the following observations can be obtained from the analysis, (see figures 1 to 4 and tables in appendix). i) The curve of output-capital ratio in both years follows a less pronounced downward slope compared with that of Japan. ii) It is important to note that, in addition to this, there are

Figure 5

BRAZIL, 1960



Source: Industrial Census.

certain segments of small and medium industries where the curves of relative share of labour show an upward slope (instead of the normal downward slope). iii) These two facts seem to determine that a considerably low level of rate of return on capital appears in such segments as those made up of enterprises of small or small-medium size (enterprises with 51 to 100 persons for 1970 and those with 16 to 50 for 1975). iv) It is particularly interesting to note that the enterprises which lost the largest share of employment as well as of gross value

of production for the period 1965-1975 were precisely those enterprises whose level of rate of return was low, as discussed above, while the smallest enterprises included in this analysis, which had a higher rate of return in comparison with typical small or medium enterprises did not lose their relative share in employment (see table 4).

In other words, it could be sustained that in Mexico, the relative share of typical small or medium enterprises in the number of employees decreased precisely because the conditions for simultaneous development discussed above were not satisfied. What is important here is the fact that the unfavourable conditions affecting those enterprises (relatively low rate of return on capital) were caused by the relatively low output-capital ratio, in spite of the comparatively high relative share of labour, which in turn was originated by the relatively low level of productivity. What probably occurred in Mexico in the period under consideration (1965-1975) was that the improvement in the conditions for simultaneous development was not obtained via an increase in labour productivity, because of the limited technological progress in small and medium enterprises in comparison with large enterprises, as the former consisted mainly of so-called traditional industries as already mentioned (see table 5).

In the case of Peru where the share of small enterprises in employment decreased considerably in the period 1963-1973, the conditions for simultaneous development changed against small enterprises because the output-capital ratio increased at a higher rate in large and medium enterprises than in small enterprises, which made the rate of return on capital of small enterprises much lower than that of the large enterprises. This unfavourable change for the former was caused principally by their relatively low rate of increase of labour productivity in comparison with larger ones, in spite of the decrease in the differentials of the capital to labour ratio by scale of enterprise.

As for Colombia, where extreme irregularities were found, a clear tendency was observed in the sense that the output-capital ratio of smaller enterprises increased at a lower rate than that of larger ones. While the level of this indicator for enterprises of 200 persons or more was less than 70% of the level for enterprises of 15 to 19 persons in the period 1959-1963, it increased to 100 or more in the period 1965-1975. Although during these two periods wage differentials increased, the relative rate of return on capital of small enterprises deteriorated clearly with respect to large ones. And it can be asserted that this deterioration originated principally from the low rate of increase of labour productivity in small enterprises in comparison with large ones, although differentials by scale in the capital-labour ratio also became more pronounced over the same period. It should be remembered that in Colombia, small enterprises lost a substantial share of employment during the whole period considered, but particularly in the period of accelerated industrial growth (1967-1974), when the deterioration in the conditions for simultaneous development was observed.

Here again labour productivity appears to be very important for the development of small enterprises. In this sense, the case of Costa Rica attracts special attention, because wage differentials are very low in this country. The

important fact is that, in spite of this, a very systematic downward curve in the output-capital ratio and the rate of return on capital is observed. The precise reason for this is that the differentials in labour productivity by size of enterprise are far lower than the differentials in the labour to capital ratio by size of enterprises. This means that in Costa Rica, where wage differentials are very low, particularly with respect to workers directly involved in production, small and medium enterprises coexist with larger ones because of a relatively high output-capital ratio and high labour productivity, which could be the result of a relatively high tecnological level.

It is necessary to investigate how small and medium enterprises can make technological progress in such a way that, in spite of the low capital labour ratio (that means the adoption of labour intensive technology), they obtain the necessary high labour productivity and high output capital ratio to be able to develop simultaneously with large enterprises. And if the conditions for simultaneous development deteriorate, it should be asked why such technological progress as can offset the deterioration is limited. It is probable that as in the case of Mexico, a large part of the small and medium industries is made up of traditional industries with limited potential for technological progress at least under the prevailing institutional set-up. Nevertheless, it would be important to analyse why, then, non-traditional small or medium enterprises were unable to develop at the same pace as the large non-traditional industries. We will discuss later the possibility of simultaneous development of small and medium industries with large ones in such sectors as heavy and chemical industries.

It is also very likely that the limited technological progress of small and medium enterprises could be to a large extent explained by discriminatory industrial policy and measures against small- and medium-sized enterprises. One of the principal conclusions of the PREALC study into small enterprises in Mexico quoted above is that, compared to large enterprises, they had very limited access to resources, including domestic and external funds, foreign exchange, technical assistance and training of workers.

The linkage of small-medium industries with large industries could also considerably help small or medium enterprises to develop simultaneously with large ones. It was suggested by the authors of the study on Colombia mentioned above that the lower rate of increase of employees in small enterprises in Colombia in the period of accelerated industrial growth under the "open" external policy might be closely connected with the process of "disintegration" of small enterprises from large ones as the latter preferred to import the components and materials which were previously supplied domestically.[27]

Therefore, in order to satisfy the necessary conditions for simultaneous development, it should be indispensable to modify the general economic policy in favour of small and medium enterprises. In most countries the policy measures to promote them appear to be not enough. a more effective policy that enables the introduction of technologicl and institutional innovation to small and medium enterprises is required to satisfy fully the necessary conditions mentioned above. We will discuss on this aspect in the second part of this chapter.

2. Simultaneous development of enterprises of different size in capital-goods-and intermediate-goods-producing industries

a) *General remarks*

As Latin American countries are making efforts to develop capital- and intermediate-goods-producing industries and at the same time to increase employment opportunities, one of the most important considerations is the kind of role small and medium enterprises can play in the development of these industries.

On considering the possibility of simultaneous development of enterprises of different size in these industries, one of the crucial points is whether the technological characteristics of these industries satisfy the requirements discussed in the previous section or not. The point is particularly important because:

1) It is believed that expansion of these industries is largely based on technology imported from labour-scarce countries and that they tend to be capital intensive, and
2) Various sectors and subsectors of these industries are characterized by "technological rigidity" and/or "scale of economy effects".

Japanese experience could be of some use here. Briefly, it can be said that in Japan parallel (and in many cases integrated) development of both labour intensive and capital intensive subsectors occurred. This was mainly due to the development of labour-intensive subsectors that have numerous interlinkages with capital-intensive subsectors.

While the technological rigidity and/or economy-of-scale effects are clearly confirmed in certain subsectors such as iron and steel production, production of automobiles (particularly that of car-bodies and engines), basic petrochemical products (ethylene monomers, etc.), fertilizer, etc., many other products of modern industry that have forward and backward linkages with the above-mentioned products do not necessarily require a determined scale or high capital intensity. In many cases technological choice for production of the latter group of goods appears to be flexible.

At a very disaggregate level (composed of a rather uniform kind of products), this fact is clearly observed. For instance, in Japan, although steel (made in furnaces) was produced almost exclusively by large-scale industries (of more than 300 workers), nearly 60% of all steel products were manufactured by small and medium-sized industries in 1960. In the case of forged and cast-steel products the proportion was over 70%. In the case of cast-iron products, more than 50% was produced by establishments with less than 100 employees. The situation is quite similar in the case of the automobile industry. The major motor-vehicle industries of Japan reached in the mid-1960s a level of output equal to that of the European countries, obliging them to invest considerable amounts in body-work dies, transfer machines, etc.; in the meantime the small and medium-sized industries that specialized in certain motor-vehicle parts

continued to use the labour-intensive processes. In 1966, as far as the production of motor-vehicles is concerned, approximately 90% of workers were concentrated in larger establishments (of more than 500 workers) while in the case of the production of motor-vehicle components, 66% of the worker were engaged in establishments of less than 500 workers. Similar cases are found in other sectors at disaggregated levels.[28]

Consequently, the factor intensity of a sector at aggregate level is determined not only by its corresponding technology —sometimes very rigid— but also by the combination of subsectors (product mix) that compose the sector, which is almost the same as saying by the employment distribution among different scale enterprises in the sector.[29] It is for this reason that fixed-capital investments per person employed in the electrical machinery and precision machinery sectors of Japan is less than that observed in the textile and food industries, as far as establishments of more than 20 workers are concerned. Fixed capital per worker in metal manufactures and general machinery sectors is also considerably less than that of food industry.

These facts suggest that the requirements for simultaneous development of enterprises of different size could be satisfied in heavy and chemical industries. The findings of M-S Project already quoted confirm this in the case of Japanese industries. Both chemical, iron and steel, non-ferrous metal industries (Group III A) and machinery, transport equipment, electrical appliances and precision machinery industries (Group III B) were found to have steeper output-capital ratio curves (partial capital productivity) than the cases of textiles, clothes, leather product industries (Group II),[30] and other industries (Group I).[31] In other words, in Group III industries, small and medium enterprises had a much higher output-capital ratio compared with large enterprises than in the case of industries of Groups I and II.

The steeper slope of the curves of Group III industries may imply a relatively greater possibility for smaller-scale enterprises to acquire advantages in terms of output-capital ratio. Although a detailed investigation into factors determining steeper curves of Group III would be necessary, the widespread existence of subsectors of labour-intensive processes in Japanese heavy and chemical industries, as mentioned before, could prove of prime importance.

As was also mentioned previously, these subsectors are in some way or another linked with capital-intensive subsectors, that is, large scale enterprises. The cases of iron and steel (large and capital intensive) linked with iron and steel products (small-medium and labour-intensive) as well as car assembly and production of components have been cited already. The former constitutes a case of forward linkage and the latter a case of backward linkage. There are various other cases such as petrochemical monomers and polymers, artificial plastic products, non-ferrous metals and metal manufactures (forward linkage) and construction of ships and production of their components (backward linkage). And it should be added here that this type of linkage is supported by the particular institutional set-up in Japan discussed later.

Consequently, from the point of view of employment the investments in large-scale capital-intensive subsectors could be justified if labour intensive subsectors linked with large-scale subsectors developed simultaneously. In this sense, in order for a labour surplus economy to attain labour-absorbing

industrialization through the expansion of heavy and chemical industries, the simultaneous development of labour-intensive subsectors with that of capital-intensive ones (or in other words the development of enterprises of different size) is crucial.

b) *Some observations on Latin American manufacturing industry*

In order to advance studies into this area, a preliminary analysis was made of the machinery sector in Brazil. Some statistical findings obtained by the PREALC study on Mexico already cited also refer to this important aspect.

First, with regard to the Brazilian machinery industry, the curve of the output-capital ratio of the electric machinery, communication equipment and general machinery manufacturing sectors showed a far steeper slope than the corresponding curve for the manufacturing industry as a whole. Nevertheles, in case of the transport equipment manufacturing sub-sector, pronounced irregularities are observed as shown in table 6. Some irregularities are also found in the case of non-electric machinery manufacturing.

On the other hand, it is very important to note that, as is shown in table 7, the number of persons engaged in large enterprises in the electric and communication machinery sector and in the transport equipment sector increased at a much higher rate than the number of small and medium enterprises. In the case of the non-electric machinery sector the rate of increase was highest in medium-sized enterprises followed by large enterprises, while persons employed in small enterprises increased at the lowest rate.

In this connection, it is wothwhile quoting the results obtained by Goncalves,[32] who was able to use the unpublished 1970 census data of capital and rate of return on capital by sector and by scale. The figures in table 8 show the index of rate of return calculated from his data. This table, confirms that a normal type downward curve of rate of return on capital is found in the manufacturing industry of Brazil in 1970. However, if we examine table 8 in detail we obtain the following very important observations:

1) In such subsectors as textile products and food processing we observe a very normal downward curve. We should add that the weight of these industries in the Brazilian manufacturing industries is relatively high.
2) In contrast, in the case of so-called modern industries, particularly machinery manufacturing we observe rather pronounced irregularities.

This second point is in marked contrast with Tajima's findings regarding corresponding figures for the machinery manufacturing subsectors of Japan.

In Mexican manufacturing industry, a similar tendency of employment distribution among different size of enterprises is observed over time. According to PREALC data, during the period 1965-1975, the number of employees in large enterprises of both the electric machinery sector and transport equipment sector increased at the highest rate and their share in the total number of persons employed by these sectors rose from 37.9% to 44.9% and from 44.2% to 69.4% respectively (see table 9).

Table 6

BRAZIL: PRODUCTION STRUCTURE OF MACHINERY MANUFACTURING SECTORS, BY SCALE, 1970[a]

(Persons employed per establishment)

	Y/L(y)	K/L(k)	Y/K(z)	W/L(w)	(Y-Lw)/K(π)
Electric machinery and communication equipment Manufacturing					
(10 - 19)	(87.8)	(111.9)	(78.4)	(96.0)	(75.4)
20 - 49	100.0	100.0	100.0	100.0	100.0
50 - 99	99.6	121.2	82.1	104.0	80.6
100 - 249	125.6	175.5	71.5	112.0	74.9
250 - 499	143.3	157.2	91.1	117.7	98.1
500 - 999	132.8	211.5	62.7	132.6	62.8
1 000 and over	130.4	229.9	56.7	138.7	55.1
Transport equipment manufacturing					
(10 - 19)	(95.4)	(94.7)	(110.7)	(92.2)	(102.5)
20 - 49	100.0	100.0	100.0	100.0	100.0
50 - 99	106.6	132.5	80.5	104.4	81.3
100 - 249	125.6	115.1	112.5	120.3	115.0
250 - 499	119.1	160.8	74.0	127.0	71.6
500 - 999	131.9	176.1	74.9	118.6	78.8
1 000 and over	310.5	163.6	189.8	166.6	234.1
Other machinery manufacturing					
(10 - 19)	(100.5)	(123.7)	(81.3)	(92.3)	(84.9)
20 - 49	100.0	100.0	100.0	100.0	100.0
50 - 99	100.6	94.8	106.0	108.5	101.3
100 - 249	99.4	98.8	100.5	104.5	97.7
250 - 499	159.9	107.7	148.1	139.5	158.4
500 - 999	109.9	110.6	99.4	123.5	92.3
1 000 and over	94.1	175.3	53.7	130.8	42.1

Source: Gonçalves, Carlos Eduardo do Nascimento, *A pequena e Média Empresa na Estrutura Industrial Brasileira*. Campinas, 1976.

[a] For symbols see note 12.

3. Contribution of small and medium enterprises to exports of manufactures

From mid-1960s, exports of manufactures increased at a considerably high rate in Latin American countries and their share in the total value of exports rose from less than 5% in 1965 to nearly 20% in 1975. The increase in the export of manufactured goods was particularly pronounced in larger countries such as Brazil, Mexico, Argentina and Colombia. During the same period, some Asian

Table 7

BRAZIL: INCREASE OF PERSONS EMPLOYED IN MANUFACTURING INDUSTRY BY SECTOR AND BY SIZE OF ESTABLISHMENT

	5-49	50-249	250 and over	Of which 500 and over
Non-metallic mineral manufactures				
1959	60.5	32.2	43.4	31.4
1974	71.0	68.5	85.9	59.7
Increase in percentage	117.4	212.7	197.9	190.1
Basic metals				
1959	31.0	42.5	95.8	67.9
1974	70.1	134.6	199.4	127.7
Increase in percentage	226.1	316.7	208.1	188.1
Non-electric machinery				
1959	15.8	19.7	25.4	17.4
1974	58.3	128.5	149.4	84.3
Increase in percentage	369.0	659.0	588.2	484.5
Electric and communication machinery				
1959	8.9	18.1	30.3	20.5
1974	19.2	54.8	121.4	86.3
Increase in percentage	215.7	302.8	404.5	420.1
Transport equipment				
1959	13.1	17.6	48.9	36.9
1974	19.9	40.2	144.1	116.8
Increase in percentage	151.9	228.4	294.7	316.5
Wood manufactures				
1959	51.8	18.3	2.5	0.6
1974	80.9	56.3	24.1	8.5
Increase in percentage	156.2	307.7	964.0	140.0
Furniture				
1959	29.8	13.6	7.7	3.4
1974	43.5	43.7	20.5	8.2
Increase in percentage	146.0	321.3	266.2	241.2
Paper and paper manufactures				
1959	7.4	14.2	18.9	12.8
1974	14.7	37.8	38.9	19.1
Increase in percentage	198.6	266.2	205.8	149.2
Rubber products				
1959	3.4	4.9	12.3	9.9
1974	9.7	14.4	26.0	19.5
Increase in percentage	285.3	293.9	211.4	197.0
Leather products				
1959	8.4	8.2	4.8	3.0
1974	6.4	12.7	9.4	3.3
Increase in percentage	77.0	154.9	195.8	110.0

Table 7 (concluded)

	5-49	50-249	250 and over	Of which 500 and over
Chemical products				
1959	13.1	19.2	42.7	31.8
1974	24.0	48.8	65.5	39.9
Increase in percentage	183.2	254.2	153.4	125.5
Textile products				
1959	32.8	57.8	234.9	171.9
1974	40.5	108.5	204.6	111.1
Increase in percentage	123.5	187.7	87.1	64.6
Clothes, shoes, etc.				
1959	40.6	31.0	16.4	8.5
1974	58.5	86.9	92.5	57.7
Increase in percentage	144.1	280.3	564.0	678.8
Food products				
1959	77.7	58.0	72.7	39.7
1974	137.6	119.6	142.8	63.1
Increase in percentage	172.6	206.2	196.4	158.9

Source: Gonçalves, Carlos Eduardo do Nascimento, *A pequena e Média Empresa na Estrutura Industrial Brasileira*, Campinas, 1976.

Table 8

BRAZIL: RATE OF RETURN ON CAPITAL BY SECTOR AND BY SCALE, 1970

	1-19	20-29	100-499	500 and over	Total
Manufacturing industry	100.0	90.8	85.0	82.1	87.1
Metallurgy	100.0	102.4	64.2	101.2	86.6
Machine manufacturing	100.0	101.0	102.8	51.2	86.6
Electric machinery	100.0	123.4	116.7	90.3	107.4
Transport equipment	100.0	147.0	97.8	125.4	120.8
Chemical products	100.0	75.2	66.7	44.8	61.5
Pharmaceutic products	100.0	81.3	94.8	-	-
Plastic materials	100.0	98.3	154.2	172.3	135.5
Textile products	100.0	76.5	47.5	55.5	58.8
Food processing	100.0	74.2	71.7	48.2	76.9
Beverages	100.0	132.1	101.0	269.9	124.3
Tobacco	100.0	109.1	98.7	283.6	188.1

Source: Gonçalves, Carlos Eduardo do Nascimento, *A Pequena e Média Empresa na Estrutura Industrial Brasileira*, Campinas, 1976.

Table 9

MEXICO: EMPLOYMENT DISTRIBUTION BY SIZE OF ESTABLISHMENT

(Machinery and transport equipment sectors)

Size of establishment	Machinery and electric machinery			Transport equipment		
	1965	1970	1975	1965	1970	1975
6 - 50	13.4	9.7	6.5	29.3	8.6	8.0
51 - 250	32.2	33.1	30.1	17.4	20.7	13.3
251 and over	53.3	57.1	63.5	53.2	70.7	78.7
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Absolute number (thousands of persons)	68.1	87.7	115.2	55.4	69.4	104.5

Source: PREALC, *Diferenciales de . . .. op. cit.*

Table 10

JAPAN: SHARE OF SMALL AND MEDIUM-SIZED ENTERPRISES IN THE EXPORTS OF MANUFACTURES

(Percentages)

	1963			1976		
	Direct export	Indirect export	Total	Direct export	Indirect export	Total
Light industries	75.5	4.0	79.0	71.0	2.8	73.8
Food	76.7	1.0	77.7	85.4	1.0	81.4
Textile	80.3	0.9	81.2	83.9	2.4	86.3
Non-metallic mineral products	50.7	2.0	52.7	58.1	2.9	61.0
Heavy and chemical industries	31.8	8.1	39.9	26.5	17.2	43.7
Iron and steel	20.3	0.6	20.9	8.9	0.3	9.2
General machinery	52.0	9.1	61.1	45.8	13.4	59.2
Electric machinery	25.0	20.8	45.8	27.5	19.6	47.1
Transport machinery	13.6	12.6	26.2	23.1	27.4	50.5
Precision instruments	60.4	10.8	71.2	41.9	15.0	56.9

Source: Small and Medium-sized Enterprises Agency, *White Paper on Small and Medium Enterprises*, 1978.

Table 11

SOUTH KOREA: EXPORTS OF SMALL AND MEDIUM-SIZED ENTERPRISES, 1962-1976

(Millions of dollars)

	Total exports (A)	Exports of manufactures (B)	Exports of small and medium enterprises (C)	Percentage (C/A)	Percentage (C/B)
1962	56.7	15.3	15.7	18.6	36.0
1965	180.5	112.4	41.6	23.0	37.0
1970	1 003.8	839.4	322.9	32.2	38.5
1975	5 427.9	4 791.2	1 871.5	34.5	39.1

Source: Association of Small and Medium-sized Enterprises (Korea) quoted by Bank of Small and Medium Enterprises, *Small and Medium-sized Enterprises in Korea*, 1977.

countries such as South Korea, Taiwan, Singapore and Hong Kong also accomplished a substantial increase in exports of these goods. Therefore, both these Asian countries and those in Latin America mentioned above are known as newly-industrialized countries which most recently entered the world market for manufactured goods. It is important to note that their exports are not limited to traditional manufactures but cover fairly diversified manufactures of heavy and chemical industries.

One of the crucial differences of the process of expansion of exports of manufactures from the two regions seems to be that while in Asian countries the participation of small and medium industries in exports is high, in Latin America their role in the export of manufactures is not very significant. In Japan, too, small and medium-sized industries have contributed substantially to the expansion of exports of manufactures.

In Japan a high percentage of the industrial products exported by small and medium enterprises (1-300 employees) in the total value of exports of manufactures has been maintained until recently. As is shown in table 10, the percentage of small and medium-sized enterprises is higher in light industries than in heavy and chemical industries. However, the latter has been increasing while the former has been decreasing. An important feature of the exports of heavy and chemical industry products made by small and medium enterprises is the considerably high percentage of their indirect exports through large enterprises.

The high level of participation of small and medium enterprises in the export of manufactures is also observed in the case of South Korea, where the percentage of their participation increased slightly in recent years while their share in total manufacturing production gradually decreased (see tables 11 and 12).

The performance of small and medium-sized firms in Latin America in the export of manufactures seems very different from that of Japan and South

Korea. Although appropriate statistical information for a comparison is not available, we can confirm that the participation of these firms in the exports of manufactures from Latin American countries seems considerably lower than in Japan and South Korea.

In the case of Mexico, for example, according to a sample survey undertaken in 1975 with respect to 599 firms:[33] which exported manufactures in that year, a very limited number of firms (14 firms) made up a considerable part

Table 12

SOUTH KOREA: PERCENTAGE OF EXPORTS IN THE TOTAL SALE OF SMALL AND MEDIUM-SIZED ENTERPRISES, 1970-1976

(Percentage)

	1970	1971	1972	1973	1974	1975	1976
Manufacturing Industry (Total)	9.1	15.4	19.5	19.0	17.6	19.6	20.2
Food and beverages	4.5	6.9	7.9	9.1	8.3	11.7	8.2
Textiles, clothes and shoes	30.1	39.5	50.4	44.8	44.0	47.1	47.7
Wood, wood manufactures and furniture	3.2	5.6	9.3	9.3	12.5	6.8	4.6
Rubbers	1.8	7.2	0.9	12.9	9.3	7.7	7.9
Chemical products and plastic	0.6	2.7	3.5	6.0	9.7	6.8	9.2
Products of non-metallic minerals	2.5	8.6	10.2	7.0	4.6	16.3	22.2
Basic metals	6.0	81.4	10.3	17.0	18.5	10.4	12.6
Metal manufactures and machinery	10.0	11.8	12.8	11.9	10.6	9.5	14.9
Other manufactures	25.7	43.5	64.6	57.1	73.9	66.2	58.8

Source: Association of Small and Medium-sized Enterprises (Korea) quoted by Bank of Small and Medium Enterprises, *Small and Medium-sized Enterprises in Korea*, 1977.

Table 13

MEXICO: DISTRIBUTION OF EXPORTS OF MANUFACTURES, BY SIZE OF VALUE OF EXPORTS, 1974

(Percentage)

Value of exports	Number of enterprises	Value of exports	Value of total sale
Total	100.0	100.0	100.0
More than 100 million pesos	2.3	42.4	33.2
75 million to 100 million pesos	1.0	5.5	4.3
50 million to 75 million pesos	2.5	9.7	5.8
25 million to 50 million pesos	6.7	15.7	14.7
Less than 25 million pesos	87.7	26.7	42.0

Source: ECLAC, *La Exportación de Manufacturas en México y la Política de Promoción*, 1976.

of total exports (42.4%), while the participation of smaller firms was low (26.7%). Here smaller firms means firms that exported a very small value of manufactures (less than 25 million pesos, i.e., approximately US$ 1 million or an average of 3 million pesos i.e., US$ 150 000) (see table 13).

The situation in Mexico can be attributed to the fact that a large proportion of exports of manufactures is made by foreign enterprises, whose scale of production is medium or large by the standards of Mexican enterprises. In fact, in 1975, 55% of the total exports of manufactures were made by foreign enterprises.[34] It should be stressed here that, the participation of these enterprises is extremely high in the case of the so-called heavy and chemical industries (metal products and machinery, 78%; chemical products, 91%; etc.) (see table 14).

Table 14

MEXICO: PARTICIPATION OF FOREIGN FIRMS IN EXPORTS OF MANUFACTURES, 1975

(Percentage)

	Total	Foreign firms	National firms
Total	100.0	55.4	44.6
Traditional goods	100.0	14.9	85.1
Food	100.0	26.7	73.3
Beverages	100.0	67.5	32.5
Textiles	100.0	1.3	98.7
Clothes and shoes	100.0	31.4	68.6
Wood manufactures	100.0	7.5	92.5
Furniture	100.0	8.9	91.1
Leather goods	100.0	3.3	96.7
Intermediate goods	100.0	70.0	30.0
Paper	100.0	3.3	96.7
Rubber	100.0	76.2	23.8
Chemical products	100.0	91.2	8.8
Oil refinery	100.0	100.0	-
Non-metallic minerals	100.0	8.5	91.5
Metal products and machinery	100.0	77.7	22.3
Metal products	100.0	43.5	56.5
General machinery	100.0	77.5	22.5
Electric machinery	100.0	71.4	28.6
Transport equipment	100.0	84.7	15.3
Others	100.0	61.1	38.9
Printed goods	100.0	50.1	49.9
Others	100.0	77.3	22.7

Source: ECLAC, *La Exportación de Manufacturas en México y la Política de Promoción*, 1976.

In the case of Brazil, the concentration of exports of manufactures seems much clearer. Twenty firms that exported manufactured goods in 1971 and 1974 respectively accounted for 35% and 30% of the total value of exports. On the other hand, those firms that exported less than US$ 1 million accounted for only 19.9% of the total value of exports of manufactures in 1974.[35]

This situation in Brazil is partly explained by the high level of participation of foreign firms and government enterprises in exports of manufactures, as in the case of Mexico. According to a study made by IPEA, foreign firms exported at least 40% of the total value of exports of manufactures from Brazil in 1973.[36] On the other hand, it is estimated that government firms realized approximately 5% of the total value of exports of manufactures.[37] According to detailed data for 1974 concerning the largest 1 000 firms in Brazil, 155 firms of them exported manufactures and their exports accounted for 43.4% of the total value of exports. It should be added that each of these 155 firms exported more than US$ 1 million of manufactures.[38]

It should also be stressed in the case of Brazil that foreign firms account for considerably high percentages of the exports of metal products and machinery as far as the 1 000 largest firms mentioned above are concerned.

The situation in Argentina seems more or less the same as in Brazil and Mexico. During the period 1969-1975, 20 principal firms that exported non-traditional exports (almost equivalent to exports of manufactured goods) accounted for approximately 35% of the total value of such exports.[39]

The above-mentioned facts seem sufficient to conclude that the participation of small and medium-sized firms in exports of manufactures in Latin American countries is yet very limited, and is much smaller than their participation in manufacturing production. However, there are some indications that these firms are increasing their share of exports in certain areas. The case of footwear exports from Brazil, which represented 5.2% of the total value of exports of manufactures in 1974 constitutes an interesting example. While 50% of footwear exports were made by 26 larger firms which exported more than US$ 1 million worth each, the rest was exported by approximately 80 smaller firms. Exports of textile products from different countries in Latin America (Brazil, Mexico, and Colombia, among others) provide another example.

B. TOWARDS SIMULTANEOUS DEVELOPMENT OF SMALL-MEDIUM ENTERPRISES WITH LARGE ENTERPRISES THROUGH TECHNOLOGICAL AND INSTITUTIONAL INNOVATIONS

1. General remarks

From the analysis of section A of this chapter, the following tentative conclusions could be drawn regarding the development of small and medium-sized enterprises in Latin America:

1) Latin American manufacturing industry is characterized by the relatively high weight of larger enterprises on the one hand and the extremely high

percentage of "cottage industries (microindustrias)" on the other, in terms of employment distribution. The participation of "typical" small and medium enterprises is considerably smaller than in the case of Japan.

2) In some Latin American countries there has been a tendency for the share of small enterprises to decrease in comparison to that of large enterprises. Indicators of the requirements for the simultaneous development of small or medium-sized enterprises with large enterprises proved to be irregular and unsatisfied in many cases and particularly in case of non-traditional sectors such as heavy and chemical industries. This fact appears to explain to some extent the fact mentioned above 1).

3) In case of machinery industries, in particular, which have developed rather recently in Latin America, the expansion of large enterprises was not fully accompanied by the simultaneous development of small and medium enterprises. This tendency is very different from Japanese experience.

4) Participation of small and medium-sized industry in exports of manufactures from Latin America have been very small compared with the case of Japan and Korea.

The fact that small and medium-sized enterprises failed to develop at the same rate as large enterprises could be closely related to the irregularities observed in the indicators of the requirements for simultaneous development, as discussed in the previous section. The findings obtained regarding these irregularities, particularly in the cases of Mexico, Colombia and Peru, seem to clarify some of the major aspects of the relationship between them and the change of employment distribution over time in these countries.

Analysis of section 1 suggests that the following factors are closely related with the tendencies mentioned above:

1) A lower rate of increase in labour productivity of small or medium-sized enterprises. This implies less intensive technological progress in these industries and/or a substantial technological gap with respect to large enterprises.

2) The lack of an institutional set-up in favour of close relationships (or interlinkage) between large and small or medium-sized enterprises to facilitate co-operation between enterprises of different size.

3) The lack of proper channels and institutional set-up for smaller or medium-sized enterprises to export their manufactured products.

4) The unfavourable effects on small and medium-sized enterprises of economic policies in general and of a series of specific measures in particular and/or lack of consistent and effective policy measures in favour of small and medium-sized enterprises, which discriminate against them in access to resources, including financial resources, technical assistance, training of workers.

These factors are interrelated and it is difficult to assess quantitatively the effects of them on the development of small and medium-sized enterprises in Latin American countries.

In the following sections, the situation of Latin American countries with regard to some of the above-mentioned aspects especially those related with institutional and technological progress is examined in the light of Japanese postwar experience. This kind of analysis would help us to identify those fields wherein efforts in Latin American countries have not yet produced the expected results and in which Japanese co-operation could be useful, thereby permitting us to suggest possible forms of Japanese co-operation for the development of small and medium industries in Latin American countries and attainment of the four goals cited before.

2. *Systematic and organized actions in favour of* small and medium industries

In recent years Latin American countries have become increasingly concerned with the role of small and medium-sized enterprises in attaining the four objectives of industrialization mentioned before.

Consequently, in many Latin American countries, policy measures in favour of small and medium-sized firms have been gradually extended and diversified. Furthermore, in some countries and regions a more integrated approach has been adopted. In this sense, of recent action taken by Latin American countries, the programme adopted by the Mexican Government through the promulgation of the National Industrial Development Plan (May 1979) is probably one of the most advanced set of measures in favour of small and medium-sized industries.

First, the National Industrial Development Plan of Mexico (PNDI) establishes finding a solution to unemployment and underemployment and improving the standard of living of the Mexican people through a high rate of economic growth as its central objectives. To this end, the Plan considers it necessary, among other things, "to articulate small- and medium-sized companies with large firms".

Secondly, the PNDI establishes as its principal incentive mechanism the issue of fiscal credit certificate to be used for payment of federal taxes, and small enterprises are given the highest percentage of this incentive (equivalent to 25% of the value of investment except when the investment is made in the federal district (Mexico City)).

In this way the important role of small and medium-sized firms in the creation of employment is fully recognized in the Plan. Consequently the PNDI not only provides incentives of a general character in favour of the creation of employment opportunities applicable to any size of firms of priority sectors[40] but also special incentives to small firms.

Thirdly, the PNDI also establishes other measures for the promotion of small and medium enterprises. The aim is "for small and medium-sized companies to link-up with the productive process of the large companies by means of a subcontracting mechanism". This, the Plan assumes, will attenuate the trend towards excessive vertical integration shown by large companies. Similarly, protection will be offered to small and medium-scale industry by

means of a body of fiscal incentives and financial support. Regarding the specific measures, the PNDI emphasizes the importance of the Programme of Integral Support for Small Firms in charge of Nacional Financiera (Public Financing Institution of Mexico).[41]

The Programme of Integral Support contains six subprogrammes: technical assistance, pre-investment study, credit, credit guarantees, subscription of part of capital stock and support for physical equipment. The activities of the various institutions in charge of these subprogrammes are co-ordinated through the Co-ordinating Committee and its Secretariat, which formulate the basic guidelines of the programme. The Nacional Financiera assigns a certain amount of funds for each subprogramme which are to be used in accordance with the norm established by the Co-ordinating Committee. The Programme also envisages the preparation of an expert group for the Secretariat as well as a group of industrial extensionists.

In Brazil, the Special Programme of Assistance for the Small and Medium-National Enterprises[42] was approved by the President in August 1977. The Special Programme includes a substantial increase in funds to finance small and medium-sized enterprises, the possibility of fiscal incentives for them, intensification of management assistance activities, promotion of new models of organization in favour of small and medium enterprise such as a system of subcontracting, an exchange market, an association of small and medium-sized firms, etc.

It is important to note that this Special Programme was adopted to complement the general scheme for industrial development, which consists of measures for the capitalization of national enterprises (approved by the President in March 1977). Besides, in some regions of Brazil, particularly in the Northeast region where the problem of unemployment is very serious, a more ambitious and integrated scheme of promotion of small and medium enterprises has been implemented.[43]

These new schemes in Mexico and Brazil are examples of the more comprehensive and integrated schemes that are being adopted by some countries of Latin America.

It is within these schemes that Japanese co-operation in favour of small and medium-sized industries should be carried out. This approach is, we believe, not only realistic but also efffective because the co-operation would be carried out in accordance with the general guidelines of the recipient country. Japanese co-operation would complement their efforts, in general and could be very useful in some specific areas of promotion where locally available resources are insufficient or where lack of expertise or experience could constitute an important bottleneck for the effective implementation of the programme.

In the following sections, some specific areas for the promotion of small and medium-sized industries which seem to be relevant for Japanese co-operation are selected from this viewpoint.

3. Institutional set-up for the integration of the production processes and export of small and medium-sized enterprises with large enterprises

a) *The subcontracting system*

As is well known, the subcontracting system is very widely developed and constitute one of the most important mechanisms enabling the present division of work between large, small and medium-sized industries in Japan. In effect, small and medium firms that are related with large firms (subcontractors) through a subcontracting system constituted 60.7% of all small and medium-sized firms in manufacturing industry in 1976, according to the Basic Survey on the Manufacturing Industry in Japan.[44] Furthermore it is important to note that the subcontracting system in Japan is organized into many subsectors, in such a way that the primary subcontractor subcontracts with secondary subcontractors and the secondary with the tertiary subcontractors, etc. There are multiple chains of subcontracting and occasionally, a subcontractor is at the same time a subcontracting firm. In other words, subcontracting relations are just an extended and complicated network of different kinds of enterprises. In the case of the automobile industry for example, a survey found that a large assembly firm had 171 primary subcontractors, 5 437 secondary subcontractors and 41 703 tertiary subcontractors, including double countings of many firms which subcontract each other. If these double countings are excluded, the number of firms involved in the subcontracting network of this automobile assembly company is about 39 470.[45]

It is reported that in countries at an advanced stage of industrialization in Latin America such as Argentina, Brazil and Mexico, the subcontracting system is quite developed. In these countries, the importance of the subcontracting system is recognized in their respective programmes for the promotion of small and medium-sized enterprises.

In the case of Mexico, as was mentioned above, the subcontracting system is considered to be one of the important mechanisms for "articulating small- and medium-sized companies with large firms" in the National Industrial Development Plan, and the Programme of Integral Support for Small and Medium Enterprises intends to strengthen the relations between enterprises of different size in the following terms: "Some mechanisms should be established with the objective of stimulating the direct participation of large industrial and commercial enterprises in the promotion, development and strengthening of the capacity of small and medium industries whose activities are closely related with the productive process of large enterprises, or could be oriented to complement the productive operations of large enterprises and ensure them the supply of goods and services in satisfactory conditions in terms of quality, timing and price. This participation of large enterprises should gradually constitute one of the main features of this Programme...".

In the case of Brazil, on the other hand, the Special Programme of Assistance for Small and Medium National Enterprises states: "The CEBRAE (Centre of Assistance for Enterprises) should establish the strategy of diffusion of "bolsa de subcontratação" (exchange market of subcontracting opportunities)

in accordance with the following steps: a) research and study in order to identify areas where experimental projects should be developed. As for the selection of regions, all aspects related with subcontracting should be considered; b) implementation of pilot projects in selected areas. Efforts should be directed to the operational aspects of the "bolsa de subcontratação"; c) extension of the system to new areas on the basis of results obtained in the pilot projects".

Japan has rich experience of organizing or supervising the subcontracting system in favour of small and medium-sized enterprises. As is well known, in spite of the various merits of a subcontracting system, it also possesses some disadvantages that affect small and medium enterprises. Among others, due to their relatively weak negotiating power, they have to accept, in some occasions, unfavourable conditions established by large enterprises. Although the interests of small and medium-sized enterprises are defended by the General Antimonopolistic Law, the Law to avoid delay in the payment of subcontractors by subcontracting firms as well as to defend smaller firms against other possible abuses by large enterprises was promulgated in 1956 in Japan.

Later, in 1970, the Law for the promotion of small and medium-sized subcontractor firms, was enacted. The main contents of the Law are: a) formulation of general norms which both large firms and small and medium firms should observe (norms regulating joint efforts for the improvement of the quality of small and medium-sized firms' products, promotion of the organization of small and medium firms, etc.); b) authorization of the programmes for the promotion of small and medium subcontractor firms elaborated jointly by large and small and medium-sized firms involved in the programme in those subsectorss where the promotion of smaller firms is considered to be highly important, and c) strengthening the promotion of subcontracting opportunities and solution of conflicts related with subcontracting offered by the Association for the Promotion of Subcontractor Firms.

We will later deal with the implications of subcontracting on the transfer of technology to small and medium-sized enterprises.

b) ***Organization for co-operation among small and medium-sized enterprises***

The organization of small and medium-sized enterprises is considered very important because if allows them to acquire greater negotiating power *vis-à-vis* large enterprises, to facilitate specialization among them, to co-operate with one another in different areas, such as joint marketing of their products, joint purchasing of materials, etc.

In Brazil, the Special Programme of Assistance for Small and Medium-sized Firms includes measures related to the "association of enterprises to obtain services and to carry out joint purchasing and selling". As complementary measures, CEBRAE is recommended to study ways of promoting associations of enterprises in the same or different subsectorss in order to realize collective actions such as purchasing, marketing, setting up of laboratories for quality control, etc.

In Mexico, the Programme of Integral Support for Small and Medium-sized Enterprises does not explicitly include the promotion of associations of

small and medium-sized firms, although support is given for physical infrastructure such as industrial parks and the establishment of service centres for industrial machinery.

Japan also has broad experience in this field which could be of some use for Latin American countries. There were approximately 43 000 associations of small and medium-sized enterprises for joint activities, and more than 52 000 associations if other kinds of organizations were included (such as associations for mutual finance, co-operatives, etc.) in 1978.[46] As far as manufacturing enterprises are concerned (according to a survey carried out by sampling), 46% of small and medium-sized enterprises participate in the activities of associations in 1976. These associations are legally constituted and were able to obtain some kind of financial support and technical assistance from the government. Joint activities of these associations include not only joint purchasing and marketing but joint production and processing, joint subcontracting, joint advertising, joint research and development (RD), finance, anti-pollution measures, training of workers, etc.

Approximately 60% of all enterprise associations were involved in some type of joint production in Japan in 1974. The main causes of joint production are as follows (figures in parenthesis are percentages of associations whose joint production activities mainly correspond to the respective item):

1) Joint processing or preparation of materials to be used by members of the association individually (27.3%).
2) Joint production of the same products (28.9%).
3) Joint production of a part of the production process (25.1%).
4) Joint production of products whose cost would be very high if they were produced individually by each member of the association (7.5%).

The associations that carry out the joint subcontracting or co-ordination of subcontracting among members corresponded to 20% of all associations in 1974. The main purpose of this activity is to rationalize and stabilize subcontracted production. Sixty-two percent of these associations jointly distribute subcontracted orders among their members: most of them according to the member's production capacity or their achievement in the past (58%), but some others (8%) distribute them on the basis of geographical location of subcontracting firms and subcontractors. Furthermore 18% of the associations accomplish the jointly subcontracted orders by their joint production, and 20% of the associations act as organizers of the jointly subcontracted production assigning to their members some parts of production processes.

With regard to other fields of joint activities, approximately 45% of associations perform joint purchasing of materials and intermediate products, and more than 55% of associations carry out financing for their member companies. Those associations that realize joint investment efforts for anti-pollution equipment account for more than 30% of all associations. Also more than 30% of associations perform joint activities in advertising. We shall deal with associations that undertake joint research and development activities later. Almost 50% of all associations carry out joint training programmes and 45% of training programmes are related to techniques of production and marketing.

These associations are organized normally at the subsectors level. There are associations to which enterprises of different industrial subsectorss belong. It is also very common for enterprises located in the same industrial zone or newly developed industrial park (industrial estate) to organize an association. Subcontractors also organize their associations.

c) *Organizations for exports of manufactures*

As was mentioned before, the participation of small and medium-sized firms in exports of manufactures is yet very limited in Latin American countries compared with Japan and Korea. Some specific institutions have played a very important role in the expansion of exports of manufactures by small and medium-sized enterprises in Japan. We should not forget here that a large percentage of these enterprises' products are exported indirectly through large Japanese enterprises. A large proportion of indirect exports are realized in the form of subcontracting of large enterprises with small and medium firms.

The principal institutional set-ups that facilitate exports by smaller enterprises in Japan are: trading companies (*shosha*), different kinds of exporters associations and some semi-governmental organizations such as the Japanese External Trade Organization.

First, with regard to *shoshas*, we should say that there is no exact parallel in other countries for Japanese enterprises specializing exclusively in trade, in particular those large-scale ones known as *sogoshosha* (integrated trading companies) that carry on both foreign and domestic trade in all kinds of articles and maintain commercial relations with almost all countries of the world. They started as intermediaries for the sale of textile products which, in the past, constituted an important share of their business. However, in the period of rapid expansion of Japanese exports from the mid-1950s, they acted as organizers, financing institutions, information centres, etc., as well as trade intermediaries for those manufacturing enterprises that wanted to export their products. This has been particularly true for small and medium-sized enterprises because they did not have their own network of export channels, funds to finance exports, necessary information, etc. Most of the exports of small and medium-sized industries are made by the trading companies. In fact, approximately 70% of Japan's exports are carried out by the 29 largest trading companies.

Secondly in certain fields, exporter's associations (*yushutsukumiai*) were no doubt very important. In Japan it was considered highly important to stabilize the export prices of certain products, especially those manufactured by small- and medium-sized enterprises whose negotiating power *vis-à-vis* the major foreign importers was slight. Since light machinery was originally Japan's main export item and was largely manufactured by small and medium enterprises, there was a pressing need to introduce some kind of price stabilizing mechanism. With this in view and in order to improve quality and generally achieve a steady increase in exports, the 1952 Import-Export Law authorized the setting-up of associations of exporters, 103 of which were established with government encouragement.

Various supplementary official measures were also applied to improve the marketing of the export products of smaller enterprises. Among others the establishment of the Japanese External Trade Organization (JETRO) meant an important support for them. JETRO provided assistance through 22 consulting centres for these firms by carrying out market research and acquiring the best articles produced by such firms for display abroad.

In Brazil, the Presidential decree to promote the creation and development of trading companies "Empresas Comerciais Exportadores" was promulgated in 1972. Now 50 trading companies are operating in accordance with the framework established by the Decree and their exports accounted for approximately 16% of total Brazilian export. In Brazil the word "trading company" is used and it is stated that this Law was enacted to introduce some institution similar to the Japanese trading companies into Brazil. A number of significant results have been obtained since the creation of trading companies. Nevertheless we must admit that many of them are not integrated trading companies, in the strict sense, but the separate entities of the former export department of industrial firms and their activities are as yet very limited. Others export a few primary products. Among new trading companies recently established in Brazil, it is worthwhile noting the experience of the State trading company called INTERBRAS which started its operation in 1975. INTERBRAS was able to organize exports of manufactured goods through the formation of "pool" of industrial firms and establish its own trademark "TAMA" in order to identify and differentiate the products exported through the INTERBRAS.[47]

In Mexico, the Consorcios de Comercio Exterior (a kind of external trade association) have been established since 1971 in accordance with the 1971 Presidential Resolution, which was revised in 1975. The basic idea of this Resolution was to help "enterprises, especially small- and medium-sized ones that did not have qualified elements devoted to the specialized function of marketing overseas".[48] In the five years following the adoption of the Resolution, 22 consorcios were established. A "consorcio" could be established by five associates, each paying at most 15% of the capital of the "consorcio" and the remaining part covered by national financial institutions. It was expected that the "consorcios" would reduce the average cost of external trade. Some consorcios are specialized in certain products such as handicrafts and the others are dedicated to different types of products. Towards the end of 1973, the National Association of "Consorcios de Exportación" was created with the participation of specific consorcios in order for the National Association to offer technical assistance to member "consorcios".[49]

Similar efforts are now being made in various Latin American countries. These countries have also demonstrated their initiative by creating new institutions for export promotion in recent years. Important examples are the Instituto Mexicano de Comercio Exterior (IMCE) in Mexico, PROEXPO in Colombia, PROCHILE, CACEX of Brazil, etc.

4. Support of technological development of small and medium enterprises

a) *Some special aspects of technological development of small and medium enterprises*

As is well known, advanced foreign technology was introduced intensively into large enterprises particularly through transnational corporations in Latin America, but it was not necessarily accompanied by the introduction of technology into small and medium enterprises.[50] Furthermore, according to an ECLAC document, "the internal technological effort in the semi-industrialized countries, particularly in Argentina, Brazil and Mexico, is already significant and increasing in importance", although "it is still in the initial stages and consists of isolated cases".[51] Nevertheless, "most of the literature on technological change and the debates which take place in the various international forums cover, expressly or implicitly, the medium-sized and large manufacturing industry, and, in the final analysis attempts to determine the most appropriate development strategy for the 'modern sector' of the economy".[52] Should this be the case, there would be ample grounds for efforts in the development and diffusion of technology for small industries.

We have already mentioned that technological progress was not introduced so intensively in small- and medium-sized enterprises as in large enterprises. As factors directly determining the speed of technological progress in these enterprises, we should distinguish at least the following three different but special areas.

1) Introduction, adaptation or development of appropriate technology for these enterprises in Latin America.[53]
2) Technical progress in such aspects are indispensable for the intensification of relationships and specialization *vis-à-vis* large enterprises: introduction of standards, quality control, etc.
3) Establishment of adequate institutional arrangements for the introduction and diffusion of technology and know-how to small- and medium-sized enterprises, including subcontracting, public institutions for technical assistance, etc.

b) *Institutions for the development of technology and technical assistance*

In most Latin American countries, the importance of the technological development of small- and medium-sized enterprises is gradually gaining recognition and different types of institutions have been established to support it.

In Brazil the Special Programme of Assistance for Small- and Medium-sized National Enterprises gives particular importance to the activities of CEBRAE. In accordance with the Programme approval was given to the provision of public finance to CEBRAE in order to duplicate its activities in the field of a) studies and research, b) technical and management consultation and c) training for management, through CEBRAE's 22 regional offices and the group of 650 experts.

In Mexico, the Programme of Integral Support for Small- and Medium-sized Enterprises contains a technical assistance subprogramme, in which different institutions related to the technological development, such as CONACYT (National Organization for Science and Technology), CENAPRO (National Centre of Productivity), IMIT (Mexican Institute of Technological Investigations), etc., participate. The fund for technical assistance is channelled to these institutions through FONEP (National Fund for Preinvestment Studies).

In Japan, technical assistance for small- and medium-sized enterprises has been carried out by various institutions since before the Second World War and in 1966 the decision was made to establish "integrated guidance centres" throughout the country —one in each prefecture. These centres were created to co-ordinate the activities of existing institutions in the field of consultation and guidance of small- and medium-sized enterprises. Their targets were: a) diagnosis and guidance by prefectural and municipal offices; b) technological guidance by testing and experimentation and research organs of prefectural and municipal governments; c) management reform activities for smaller-scale enterprises by chambers of commerce and industry, and d) guidance for horizontal associations by the National Federation of Smaller Business Associations.

As far as the development and diffusion of technologies appropriate for small- and medium-sized industries are concerned, the activities of prefectural and municipal governments through their specialized institutes of experiment, research and development of technology have been very important in Japan. Towards the end of the 1970s, there were approximately 600 local public institutes for testing and developing technology, that is more than seven times the number of national institutes of technology. The number of researchers working there is one and half times that in national institutes, 30 to 50 persons in each institute, although research expense is two-thirds that of national institutes. Each prefecture has its own policy of technological development for local enterprises and has accumulated considerable experience. For instance Nagano Prefecture took the initiative of promoting small- and medium-sized precision industry enterprises with a high level of efficiency.

These local institutes have accomplished their important role not only in the development of technologies appropriate for small-medium-sized enterprises, but in the diffusion of these technologies through guidance as well as in testing and experimenting on the products produced by these industries.

c) *Importance of interrelation between progress in institutional set-up and technological development*

The technological developemnt of small- and medium-sized enterprises is closely related with the changes in their institutional set-up. Their technological updating is considerably facilitated by appropriate institutions. For example, subcontracting system permits technology transfer from large enterprises to small enterprises, as mentioned later. Co-operation between small and medium enterprises through different kinds of institutional arrangements, such as association, for example, could have important implications on their

technological development. If the members of an association initiated joint production, it would permit the introduction of more advanced machinery and equipment which the scale of production of the individual member countries prevents them from using. If, on the other hand, they agreed on a division of labour between member companies, they could specialize in certain production processes introducing advanced technology and specialized machines. In certain industries such as the machine-tool industry this aspect is particularly important.

Technical assistance from large subcontracting firms to small subcontractor firms constitutes one of the most important means of technological transfer in Japan. According to a survey conducted by the Small and Medium Enterprises Agency (Ministry of International Trade and Industry in 1975), 53.9% of subcontractor firms were receiving technical assistance from subcontracting firms. Although those subcontractors that depend highly on one subcontracting firm receive considerable technical assistance, 33.5% of those firms that depend for less than 30% of their business on one subcontracting firm were receiving technical assistance from subcontracting firms. It is also very common for subcontracting firms to lend machinery or sell second-hand machinery at low prices to subcontractor firms. According to the same survey, 29.1% of the subcontractors obtained machines from subcontracting firms. Needless to say, in addition to this assistance, subcontracting firms give management guidance and financial assistance. According to another survey conducted in the same year on subcontracting firms, 86% of them sent specialists in technical assistance to their respective subcontractors and 80% of them received trainees from subcontractors. Furthermore, 24% of them gave patented industrial rights to their subcontractors and 70% of them some kind of financial assistance.

Although there is no comprehensive study on these institutional and technological aspects of the relationship between large-, small- and medium-sized enterprises in Latin America, some partial, but interesting studies regarding these aspects suggest that the adequate institutional arrangements are not fully developed in the region.

According to a case study on the subcontracting system in Chile the following points seem relevant:[54]

1) Subcontracting firms (large enterprises) do not have any explicit policy concerning subcontracting and the percentage of components supplied by subcontractors is low (less than 15%).

2) Subcontractors (smaller firms) lack of the means to show their production capacity to subcontracting enterprises in order to obtain contracts.

3) There is no technological transfer from large enterprises to subcontractors, the only exception being inspection of the quality of products to be delivered to subcontracting firms. It is not common for large enterprises to help smaller ones in the production of subcontracted components or materials.

4) Small enterprises do not have any adequate organization through which they can co-operate among themselves.

According to an ECLAC article, in Latin America subcontracting is most developed in Argentina, Brazil and Mexico, particularly in the motor-vehicle industry.[55] However, as we noted in the previous section, small- and medium-sized enterprises, particularly the machine-tool industries where subcontracting is very common failed to develop simultaneously with large enterprises.

Co-operation also has considerable implications for the technological updating of small- and medium-sized firms. As was mentioned before, some of these enterprises' associations are pursuing joint research and development efforts. Joint efforts are being made in both the improvement and development of products, their design, the improvement of technology or machinery for production process, etc. One of the important advantages of joint efforts is that it is easier to obtain different kinds of support and assistance from outside. For example, according to a survey conducted by the above-mentioned agency in 1974, more than 70% of joint research and development projects received guidance from outside and 13% of them realized their project jointly with public institutes of technology (public laboratories) and 15% of them entrustred the realization of their projects to some outside organizations including public institutions.

Finally, the importance of diffusion of standard norms and quality control system in the process of technological progress of small and medium enterprises should be emphasized.[56] Progress in these areas permit small enterprises to specialize in certain process of production enabling more advanced division of labour (vertical integration) both with large enterprises and with other small and medium enterprises. An interesting and classic example of the effects of standardization is the case of the sewing-machine industry in Japan. Most plants producing these machines were small or medium firms, but when official standards were established for its components, most enterprises specialized in the production of small number of parts. The production processes of each firm were in this way simplified and gradually multi-purpose machine-tools were replaced by specialized machines.

On the other hand, standardization of components is important for subcontractors, because they could diversify their subcontracting firms instead of depending on one large subcontracting company.

C. NEW FORM OF CO-OPERATION BETWEEN LATIN AMERICA AND JAPAN IN THE FIELD OF INDUSTRY AND TRADE

Bearing in mind the analysis and findings obtained in the previous sections, we consider that the following constitute the main elements of new forms of co-operation between Latin America and Japan.

1. General principles and priorities

The basic approach for the consideration of the new forms of co-operation is that such forms should take fully into account the industrial development strategy of Latin America at the semi-industrialized phase, in particular the

goals it wishes to accomplish. As was mentioned at the beginning of this chapter, it is not easy to attain these four goals simultaneously. Nevertheless the analysis of the previous sections appears to suggest that this is possible through appropriate policy measures that permit the introduction of technological and institutional innovations into manufacturing industry, especially small- and medium-scale firms. These possibilities were discussed both from a theoretical and practical point of view. It was also suggested that Japanese experience could be useful in attaining these goals. Therefore, in short, co-operation between Latin America and Japan should be such that it effectively contributes to the realization of Latin America's industrial development strategy, in particular, simultaneous accomplishment of the four goals.

Needless to say the specific areas that are most appropriate for co-operation with Japan will be different in each country. Such areas should be identified in accordance with each country's priorities and with the capacity of Japan to co-operate effectively. The specific socio-economic conditions, availabilities of resources, etc., of each country should be fully taken into consideration. For instance, the development of an industry that processes commodities could be important in some countries in view of its favourable impact on other industries. For example, capital-goods producing sectors (particularly for the development of energy) in Mexico, processing of non-ferrous metals in Chile and Peru could be selected as the priority areas for co-operation with Japan. Concentrated efforts in these areas could probably contribute more effectively to the industrial development of each country.

2. Programme of new forms of co-operation

In formulating a programme of co-operation for specific areas, it is indispensable to observe the following points:

1) The co-operation programme should be developed and put into effect in collaboration with institutions in Latin American countries that have experience in specific areas.
2) The co-operation programme should complement or support the policies and measures taken by the respective countries to promote industrial development, exports, small and medium industries, etc.
3) Concerted efforts by different Japanese institutions (institutions in charge of financial co-operation, technical co-operation, the promotion of mutual trade and investment, etc.) should be made towards specific high priority areas.

In the field of technical co-operation, the programme for specific areas identified as being of high priority for co-operation with Japan should contemplate, among others:

1) technical assistance to small- and medium-sized industries, particularly for such production processes as are most appropriate for these industries;

2) technical co-operation in such fields as permit more intensive integration between enterprises of different size: standardization of industrial norms and specifications, quality control, etc.;

3) co-operation for the establishment of such institutional set-ups as permit the technological progress of small- and medium-sized industries and integration between them, and large enterprises, as well as expansion and diversification of exports of manufactured goods, especially by small- and medium-sized industries;

4) training of engineers and workers in order to support the above-mentioned technical co-operation, particularly preparation of specialized group of instructors to bring about multiplier effects on technological progress, even after co-operation programme with Japan has finished.

In the field of financial co-operation, higher priority should be given to financing for small- and medium-sized enterprises. The Export-Import Bank of Japan has already taken initiatives to extend financial co-operation to these enterprises in some countries of the region through local banks. This and similar initiatives should be intensified. It is also desirable to support the construction of industrial zones for small- and medium-sized industries and other projects which directly or indirectly contribute to their promotion. Co-operation with the efforts of the Inter-American Development Bank to expand the special fund to finance small- and medium-sized enterprises would be also desirable.

As for co-operation through trade, improvement of the competitiveness of Latin American manufactures appears to be most necessary, if we consider the severe competition from products exported by neighbour countries, particularly newly industrializing countries in Asia, to Japan. The above-mentioned technical and financial co-operation could be effective in improving the competitiveness of Latin American products on the Japanese market. However, in addition to this basic effort, complementary efforts should be made in the areas of marketing, adaptation of Latin American products to Japanese market (design, specification appropriate for Japanese consumer preferences, etc.), establishment of channels of commercialization for Latin American products, and so on.

Co-operation at the private-sector level could be also important. Co-operation or joint ventures between small- and medium-sized Latin American and Japanese enterprises could be an interesting new formula and could be effective in introducing into Latin American small- and medium-sized enterprises, technology, organizational and management know-how as well as techniques for exporting manufactures.

Appendix Tables

OUTPUT-LABOUR RATIO (k), LABOUR PRODUCTIVITY (y), WAGE (w), OUTPUT-CAPITAL RATIO (z), RELATIVE SHARE OF LABOUR (β) AND RATE OF RETURN ON CAPITAL (π) OF MANUFACTURING INDUSTRY OF SOME LATIN AMERICAN COUNTRIES

AT. 1: MEXICO, 1970

Size of firm	k	y	w	β	z	π
6 - 15	100.0	100.0	100.0	100.0	100.0	100.0
16 - 50	147.2	138.7	140.7	101.4	94.3	93.4
51 - 100	183.1	159.0	169.5	106.6	86.8	82.9
101 - 250	246.9	205.2	196.4	95.7	83.1	85.6
251 - 500	273.9	212.5	219.6	103.3	77.6	75.8
501 -	382.6	260.8	258.2	99.0	68.2	68.7

Source: Same as figures 3 and 4.

AT. 2: MEXICO, 1975

Size of firm	k	y	w	β	z	π
6 - 15	100.0	100.0	100.0	100.0	100.0	100.0
16 - 50	209.2	168.7	180.5	103.1	84.6	78.7
51 - 100	264.3	226.0	221.9	94.6	85.5	89.1
101 - 250	339.0	255.6	244.4	92.1	75.4	80.0
251 - 500	458.2	327.6	294.9	86.8	71.4	78.6
501 -	526.0	356.7	343.2	92.6	67.8	71.7

Source: Same as AT. 1.

AT. 3: BRAZIL, 1960

Size of firm	k	y	w	β	z
20 - 49	100	100	100	100	100
50 - 99	111	103	108	105	93
100 - 249	129	120	112	93	92
250 - 499	140	123	118	96	88
500 - 999	165	122	119	97	74
1 000 -	157	150	137	91	95

Source: Calculated from Industrial Census of Brazil.

AT. 4: CHILE, 1967

Size of firm	k	y	w	β	z	π
20 - 49	100	100	100	100	100	100
50 - 99	106	115	128	111	109	106
100 - 199	124	118	146	124	95	89
200 - 499	160	184	169	92	115	118
500 -	328	186	225	124	55	52

Source: Calculated from *Fourth National Census of Manufactures of Chile.*

AT. 5: COSTA RICA, 1974

Size of firm	k	y	w	β	z	π
1 - 4	100	100	100	100	100	100
5 - 9	186	145	115	79	77	86
10 - 29	256	311	279	91	64	67
30 - 49	375	179	172	97	47	48
50 - 69	433	273	169	64	63	75
70 - 99	515	241	203	85	39	51
100 - 129	633	252	194	79	45	45
130 - 149	596	271	222	82	49	49
150 -	543	303	182	61	56	67

Source: See note 16.

AT. 6: PERU, 1963

Size of firm	k	y	w	β	z	π
5 - 9	100	100	100	100	100	100
10 - 14	115	122	123	100	106	105
15 - 19	112	159	139	88	142	154
20 - 49	179	182	170	93	102	106
50 - 99	844	259	207	80	31	35
100 - 199	319	342	240	70	107	128
200 - 499	479	429	280	65	89	110
500 -	555	613	318	53	110	145

Source: See note 15.

AT. 7: PERU, 1973

Size of firm	k	y	w	β	z	π
5 - 9	100	100	100	100	100	100
10 - 14	155	120	133	111	78	72
15 - 19	65	145	150	103	222	217
20 - 49	162	229	191	84	141	155
50 - 99	365	269	222	82	74	82
100 - 199	157	367	267	74	234	273
200 - 499	242	444	321	71	184	215
500 -	247	343	266	79	139	158

Source: Same as AT.6.

AT. 8: COLOMBIA, 1960

Size of firm	k	y	w	z	π
5 - 19	100	100	100	100	100
20 - 24	109	109	111	100	100
25 - 49	176	141	127	83	90
50 - 74	148	170	146	114	125
75 - 99	166	195	167	118	130
100 - 199	232	280	174	121	152
200 -	360	249	205	69	84

Source: See note 17.

AT. 9: COLOMBIA, 1973

Size of firm	k	y	w	z	π
5 - 19	100	100	100	100	100
20 - 24	106	116	106	110	116
25 - 49	118	140	123	117	125
50 - 74	138	156	148	112	116
75 - 99	150	206	176	136	148
100 - 199	176	272	210	152	173
200 -	318	354	297	110	120

Source: Same as AT. 8

Chapter 2

DUALISTIC ECONOMIC DEVELOPMENT: AN ECONOMETRIC MODEL OF JAPAN, 1954-1968

Introduction

Much attention has been paid to the rapidity of Japanese growth and several long-term models have been constructed to explain the economic development of pre and postwar Japan (e.g., Economic Planning Agency [1], Klein [4], Klein and Shinkai [5], Ueno [10], and Ueno and Kinoshita [11]. In these models the entire industry is divided into two sectors:[57] the primary or agricultural sector and the manufacturing sector. The models with this sectoral breakdown are useful to explore the change in Japan's industrial structure as well as the pace of economic growth. However, it was not until the book by Kelley and Williamson [3] was published that the so-called "dualistic structure" of Japan's economy was systematically investigated within the framework of a macroeconometric model (except possibly for Ichimura, Klein, Koizumi, Sato and Shinkai [2]). Using the quantitative estimates of LTES (*Estimates of Long-Term Economic Statistics of Japan since 1868:* Ohkawa, Shinohara and Umemura [8]), they attempted to construct a closed-economy model of economic dualism and to reinterpret the growth of Meiji Japan. Minami and Ono [6] have developed similar models, where detailed attention is directed to the labour market.

Although various hypotheses have been presented to explain "dualism" in Japan, they are closely related to the Ohkawa-Rosovsky framework which emphasizes the coexistence of indigenous and modern activities. On the supply-production side of the economy, Rosovsky and Ohkawa [9] find that indigenous industries are much more concentrated in the small-scale sector and their economies of scale are generally much smaller than the national average. On the demand side, their data indicate that indigenous consumer preferences are still very significant and that they have changed rather slowly in spite of rapid modernization in certain parts of the economy. Having established the quantitative expressions, they conclude that the indigenous sectors contributed to provide "total employment" and the efficient use of capital under conditions of capital shortage.

The purpose of this chapter is to present a sectoral model of the Japanese economy during her postwar semi-industrial phase, in order to serve as the basis for the analyses of the previous chapters. Our model must be limited to a sample

period of the era after World War II, since detailed data are not available before the postwar period. In section 2 we shall briefly deal with the features of our basic data. We shall examine some properties of the model from the point of view of each equation in section 3. Results obtained are then used to test the role of indigenous sectors in a long-run dynamic context in section 4. Finally a summary of the main results is given in section 5.

A. THE DATA

In order to make this type of model suitable for dealing with the structural change of the Japanese economy, the long-term model must be composed of at least five sectors: 1) agriculture, forestry and fishing (sector A), 2) indigenous manufacturing sector (sector M1), 3) modern manufacturing sector (sector M2), 4) social overhead sector (sector O) or facilitating industries: transportation, communication, and public utilities, and 5) service sector (sector S).

It should be noted that this sectoral breakdown calls for more detailed information on finely defined product classes than the sectoral breakdown in growth-theory literature which only distinguishes between capital and consumer goods sectors. In particular, from an operational point of view, it is difficult to draw a clear line between indigenous and modern manufacturing sectors. In fact the selection of the industries which produce indigenous commodities in the *Census of Manufactures* calls for data on a four-digit level in the standard industrial classification. However, since indigenous industries are much more concentrated in the small-scale sector, it is possible to characterize industry as indigenous or modern by size of establishments. Moreover this standard of demarcation permits the utilization of the recent results obtained by Ohkawa and Motai [7].[58]

First of all, we have to make up a convenient and useful grouping of industries. Out of a number of possibilities, we have adopted a grouping by the scale of distribution of labour employment, the share (percentage) of the industry's total to classify three groups. A simple example, taking small-scale industries (1-49 workers) as the indicator is shown below.

> Group A (largest share of the small scale, ranging from 72.3%-51.8%): wood and wood product, furniture, leathers, clothes, food, metals.
> Group B (intermediate share of the small scale, ranging from 44.3%-35.6%): printing, pulp-paper, ceramics, textiles, general machinery, precision machinery.
> Group C (smallest share of the small scale, ranging from 19.1%-9.0%): rubber, non-ferrous, steel and iron, transportation machinery, electric machinery, petroleum and coal, chemicals.

This simple grouping may serve our present purpose of broadly identifying the correspondence seen between industry and scale of enterprises (Ohkawa and Motai [7], p. 4; see also table 3, which was reproduced from appendix table, AT-1 in Ohkawa and Motai [7]).

Table 1

DISTRIBUTION OF WORKERS BY NUMBER OF EMPLOYEES, BY THREE GROUPS[a]

(Percentages)

Industry and class \ Number of workers	I 1-3	II 4-9	III 10-19	IV 20-29	V 30-49	I+ II+ III+ IV+ V	VI 50-99	VII 100-199	VIII 200-299	IX 300-499	X 500-999	XI 1000
Group A:[b]												
Wood and wood products	6.1	18.6	22.7	12.2	12.7	72.3	11.6	6.2	2.7	1.9	2.7	2.6
Furniture	10.0	21.0	17.4	9.9	9.9	68.2	10.4	7.0	3.3	4.0	1.8	5.3
Clothes	5.5	17.2	17.2	8.7	11.9	68.1	15.0	11.6	5.2	3.1	2.4	2.2
Leathers	9.1	24.1	16.2	9.3	9.4	60.5	11.0	6.4	3.9	3.5	7.1	
Food	8.2	17.7	14.3	6.8	7.7	54.7	9.1	8.3	4.4	6.8	4.7	12.0
Metals	5.2	14.6	15.0	8.4	10.8	54.0	13.4	9.7	4.6	5.2	5.1	8.0
Group B:[c]												
Printing	2.3	10.8	13.2	8.4	9.6	44.3	11.3	9.5	3.2	4.7	3.8	23.2
Pulp, paper	3.6	12.6	10.6	7.5	9.9	44.2	12.8	9.6	4.8	5.9	6.4	16.3
Ceramics	3.6	12.5	10.5	6.2	8.3	41.1	11.3	10.6	5.3	4.7	8.4	18.6
Textiles	6.2	12.4	9.4	5.7	6.8	40.5	8.8	7.4	3.2	4.8	5.1	30.2
Machinery	2.0	8.3	10.1	6.3	9.1	35.8	12.0	10.8	6.5	7.4	7.9	19.6
Precision machinery	1.9	8.9	10.3	5.9	8.6	35.6	11.9	11.4	5.8	4.9	9.6	20.8
Group C:[d]												
Rubber	0.8	4.5	4.3	3.5	6.0	19.1	7.0	8.4	3.9	6.7	54.9	
Non-ferrous	0.8	4.0	4.1	3.7	4.3	16.9	5.7	7.4	3.0	6.4	9.7	50.9
Steel	0.3	2.2	4.1	4.0	5.1	15.7	6.4	6.4	2.3	4.7	5.2	59.3
Transportation machinery	1.1	3.6	3.8	3.0	3.9	15.4	6.6	6.9	3.3	4.4	6.5	56.9
Electric machinery	0.5	2.9	3.9	3.1	4.7	15.1	8.3	8.0	4.6	5.9	6.7	51.4
Petroleum	0.1	1.4	3.3	2.2	3.4	10.4	4.9	6.8	2.1	2.2	11.2	62.4
Chemical	0.5	1.7	2.3	1.7	2.8	9.0	5.0	6.9	4.4	5.2	8.9	60.6

[a] Three groups have been established on the basis of the aggregates of percentage of employees (column 5) within the selected industries whose number of employees range from 1 to 49. [b] Amount of the aggregate is more than 50% of the industry. [c] Amount of the aggregate falls 30-40% of the industry. [d] Amount of the aggregate is less than 29% of the industry.

Table 2

VALUES OF ENDOGENOUS VARIABLES

	N1	N2	NO	DA	D1	D2	DO
1953	20.360	39.774	18.308	3492.47	3831.01	5035.02	1475.8
1954	21.607	41.154	18.856	3639.26	4006.10	5265.74	1583.7
1955	22.605	42.150	19.283	4221.90	4375.47	5675.06	1704.5
1956	23.436	45.858	20.013	4172.08	4711.97	7106.70	1928.4
1957	24.593	50.614	21.063	4359.69	5023.27	8483.20	2140.4
1958	24.418	50.143	21.746	4376.84	5187.75	8120.66	2266.0
1959	25.614	53.593	23.146	4634.98	5638.90	10191.00	2528.3
1960	27.369	59.922	24.441	4851.86	6269.21	13216.00	2902.0
1961	29.074	64.810	26.203	5119.03	7068.31	16247.30	3319.9
1962	30.569	67.898	27.287	5159.77	7666.10	17112.60	3679.3
1963	32.923	70.834	28.401	5295.76	8588.34	19179.00	4131.2
1964	33.535	72.929	30.205	5521.56	9153.34	22630.40	4578.3
1965	34.229	74.060	31.086	5664.20	9658.98	22987.60	5009.3
1966	35.505	75.078	31.691	5926.70	10614.00	26403.50	5569.7
1967	35.979	77.470	32.783	6337.20	11802.60	32805.30	6327.2
1968	36.779	80.580	33.440	6556.96	12604.70	37827.00	7074.6

Table 2 (continued 1)

	ΔK1	ΔK2	ΔKO	XI	X2	IA	II
1953	33.1	185.3	225.9	108.5	325.5	303.0	130.2
1954	50.6	225.3	310.3	138.8	456.9	316.1	136.3
1955	44.8	210.9	234.2	185.5	571.1	346.9	133.1
1956	55.6	242.8	330.6	191.7	693.7	404.5	113.8
1957	50.4	496.2	398.8	202.8	766.7	414.7	101.0
1958	87.9	522.5	471.1	232.6	768.0	413.4	107.8
1959	70.8	558.3	538.0	296.2	895.4	492.9	96.5
1960	139.0	942.6	773.6	281.1	1062.8	552.7	110.8
1961	152.0	1265.1	821.1	269.6	1159.7	663.6	145.0
1962	261.7	1468.4	968.5	257.6	1370.2	647.8	157.3
1963	276.3	1434.1	1058.4	266.2	1533.0	783.6	196.9
1964	292.5	1715.2	1261.5	304.2	1881.2	868.7	231.9
1965	289.7	1444.1	1245.3	347.6	2434.6	934.5	268.0
1966	305.4	1224.0	1412.2	386.7	2922.2	1077.5	314.8
1967	386.5	1846.9	1444.9	384.9	3138.8	1172.9	344.5
1968	539.7	2718.4	1700.7	425.0	3957.0	1298.4	376.0

Table 2 (continued 2)

	I2	PO1	PO2	POO	W1	W2	WO
1953	246.8	73.60	100.35	74.56	122.8	171.4	214.6
1954	231.3	79.32	96.60	76.69	132.6	184.6	235.3
1955	221.9	77.01	94.69	80.29	135.1	189.1	250.2
1956	335.5	77.42	104.40	83.25	143.7	207.7	268.2
1957	532.1	81.38	108.74	87.42	152.9	220.9	287.2
1958	367.7	80.30	99.85	85.31	165.1	231.9	292.5
1959	458.2	81.33	100.95	86.65	176.3	247.2	306.5
1960	571.2	85.40	101.22	87.76	192.6	270.5	331.0
1961	830.4	89.60	102.14	91.52	224.9	307.2	370.3
1962	742.4	90.88	99.79	93.06	262.1	338.7	420.9
1963	858.0	94.55	100.17	93.56	298.8	378.2	461.6
1964	1005.2	96.22	100.11	98.15	338.5	426.3	519.1
1965	873.7	100.00	100.00	100.00	374.9	463.5	572.9
1966	987.3	103.84	99.84	104.37	412.6	515.8	634.7
1967	1367.9	106.69	100.12	105.17	470.0	589.8	703.4
1968	1432.9	112.13	100.04	106.49	529.5	630.1	803.7

Table 2 (continued 3)

	Q	YD	PC	SA	S1	S2	SO
1953	3.8	4081.7	64.6	3214.1	3809.3	5113.7	1475.8
1954	4.6	4552.5	69.8	3351.5	4008.6	5491.4	1583.7
1955	4.9	5160.5	72.5	3912.1	4427.8	6024.2	1704.5
1956	3.5	5627.8	71.5	3817.7	4789.9	7464.9	1928.4
1957	2.8	6217.4	72.8	3991.8	5125.0	8717.7	2140.0
1958	3.5	6652.4	74.8	4032.5	5312.5	8520.9	2266.0
1959	2.7	7460.5	74.8	4216.6	5838.6	10628.1	2528.3
1960	1.7	8634.7	76.3	4367.0	6439.5	13707.6	2902.0
1961	1.4	10160.4	79.4	4520.7	7192.9	16576.6	3319.9
1962	1.5	11656.0	84.5	4596.7	7766.5	17740.4	3679.3
1963	1.4	13595.6	89.2	4583.2	8657.7	19854.1	4131.2
1964	1.3	15583.1	95.4	4724.1	9225.6	23506.3	4578.3
1965	1.6	17628.8	100.0	4804.2	9738.6	24548.5	5009.3
1966	1.4	20205.3	106.5	4910.8	10685.9	28338.4	5569.7
1967	1.0	23636.3	111.7	5217.5	11842.9	34576.2	6327.2
1968	0.9	27380.9	116.2	5319.4	12653.7	40351.1	7074.6

Table 2 (concluded)

	K1	K2	KO	S	P	N	ΔK
1953	875.4	3628.5	5500.9	21947.5	73.19	358.889	829.600
1954	926.0	3853.8	5811.2	23082.2	74.93	361.501	1008.200
1955	970.8	4064.7	6045.4	25253.8	74.00	370.360	890.900
1956	1026.4	4307.5	6376.0	27844.7	79.52	377.556	1057.200
1957	1086.8	4803.7	6774.8	30873.6	84.06	386.262	1515.400
1958	1174.7	5326.2	7245.9	31868.2	80.07	387.247	1627.200
1959	1245.5	5884.5	7783.9	36427.9	82.41	392.938	1568.400
1960	1384.5	6827.1	8557.5	42575.2	85.94	408.395	2801.200
1961	1536.5	8092.2	9378.6	48869.5	90.51	421.210	3312.400
1962	1798.2	9560.6	10347.1	53063.4	91.82	433.634	4061.300
1963	2074.5	10994.7	11405.5	58543.5	94.60	444.965	4181.100
1964	2367.0	12709.9	12667.0	66575.3	97.25	450.929	5152.100
1965	2656.7	14154.0	13912.3	70568.1	100.00	454.117	4743.000
1966	2962.1	15378.0	15324.5	78538.2	103.19	463.215	5005.500
1967	3348.6	17224.9	16769.4	89717.2	106.06	473.079	6036.900
1968	3888.3	19943.3	18470.1	101609.0	108.45	483.330	7587.300

Table 3-1

SIMULATION RESULTS (S2/S1)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	1.342	-	-	-	-	-	-
1954	1.370	-	-	-	-	-	-
1955	1.361	1.394	1.395	1.385	1.395	1.393	1.380
1956	1.558	1.382	1.384	1.346	1.384	1.380	1.393
1957	1.701	1.478	1.483	1.399	1.481	1.475	1.497
1958	1.604	1.594	1.621	1.507	1.599	1.584	1.604
1959	1.820	1.676	1.743	1.571	1.684	1.652	1.655
1960	2.213	1.896	1.999	1.786	1.918	1.868	1.863
1961	2.305	2.106	2.259	1.974	2.150	2.052	2.066
1962	2.284	2.380	2.645	2.219	2.449	2.252	2.324
1963	2.293	2.615	2.953	2.402	2.744	2.394	2.533
1964	2.548	2.949	3.475	2.674	3.149	2.599	2.875
1965	2.521	3.001	3.580	2.665	3.292	2.616	2.929
1966	2.652	3.034	3.627	2.644	3.354	2.614	2.956
1967	2.920	3.106	3.748	2.666	3.457	2.656	3.009
1968	3.189	3.097	3.781	2.603	3.477	2.655	2.986

Table 3-2

SIMULATION RESULTS (N2/N1)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	1.954	-	-	-	-	-	-
1954	1.905	-	-	-	-	-	-
1955	1.865	1.753	1.757	1.730	1.758	1.750	1.724
1956	1.957	1.583	1.587	1.508	1.586	1.580	1.597
1957	2.058	1.650	1.661	1.507	1.654	1.647	1.690
1958	2.054	1.754	1.818	1.551	1.758	1.699	1.734
1959	2.092	1.736	1.861	1.552	1.743	1.708	1.698
1960	2.189	1.979	2.181	1.778	2.004	1.914	1.912
1961	2.229	2.185	2.468	1.962	2.238	2.109	2.114
1962	2.221	2.454	2.890	2.315	2.500	2.288	2.365
1963	2.152	2.584	3.034	2.284	2.690	2.335	2.467
1964	2.175	2.805	3.467	2.473	2.955	2.449	2.729
1965	2.164	2.582	3.181	2.226	2.815	2.250	2.523
1966	2.115	2.366	2.881	1.988	2.590	2.047	2.312
1967	2.153	2.209	2.691	1.801	2.405	1.961	2.141
1968	2.191	2.044	2.511	1.652	2.229	1.775	1.966

Table 3-3

SIMULATION RESULTS ([S2 : SO] / S1)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	1.730	-	-	-	-	-	-
1954	1.765	-	-	-	-	-	-
1955	1.745	1.771	1.772	1.764	1.772	1.770	1.756
1956	1.961	1.771	1.773	1.740	1.774	1.768	1.783
1957	2.119	1.877	1.881	1.801	1.881	1.873	1.894
1958	2.030	2.011	2.032	1.922	2.017	1.998	2.021
1959	2.253	2.099	2.161	1.994	2.109	2.072	2.080
1960	2.579	2.334	2.436	2.223	2.360	2.302	2.303
1961	2.766	2.566	2.723	2.430	2.618	2.504	2.528
1962	2.758	2.871	3.154	2.699	2.952	2.721	2.815
1963	2.770	3.130	3.496	2.901	3.283	2.872	3.047
1964	3.044	3.502	4.082	3.205	3.736	3.093	3.430
1965	3.035	3.558	4.200	3.195	3.898	3.105	3.489
1966	3.173	3.593	4.250	3.174	3.970	3.099	3.519
1967	3.454	3.677	4.384	3.206	4.091	3.149	3.583
1968	3.748	3.663	4.413	3.137	4.110	3.142	3.555

Table 3-4

SIMULATION RESULTS ([N2 : NO] / N1)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	2.853	-	-	-	-	-	-
1954	2.777	-	-	-	-	-	-
1955	2.718	2.806	2.808	2.792	2.813	2.801	2.772
1956	2.811	2.644	2.649	2.583	2.650	2.639	2.669
1957	2.915	2.713	2.721	2.563	2.719	2.707	2.749
1958	2.944	2.852	2.902	2.618	2.859	2.789	2.832
1959	2.996	2.816	2.940	2.593	2.827	2.773	2.779
1960	3.082	3.097	3.321	2.851	3.128	3.006	3.031
1961	3.130	3.375	3.709	3.093	3.449	3.272	3.305
1962	3.114	3.750	4.297	3.596	3.821	3.519	3.697
1963	3.014	3.943	4.527	3.555	4.104	3.589	3.820
1964	3.075	4.258	5.138	3.834	4.487	3.749	4.195
1965	3.072	3.980	4.786	3.546	4.330	3.494	3.940
1966	3.007	3.707	4.399	3.232	4.049	3.217	3.672
1967	3.064	3.514	4.146	3.042	3.817	3.122	3.463
1968	3.100	3.271	3.874	2.791	3.555	2.851	3.209

Table 3-5

SIMULATION RESULTS (W2/W1)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	1.395	-	-	-	-	-	-
1954	1.392	-	-	-	-	-	-
1955	1.400	1.419	1.419	1.420	1.417	1.420	1.417
1956	1.445	1.423	1.413	1.414	1.410	1.415	1.416
1957	1.444	1.404	1.404	1.406	1.399	1.408	1.408
1958	1.405	1.411	1.410	1.417	1.404	1.419	1.412
1959	1.402	1.410	1.407	1.416	1.401	1.420	1.408
1960	1.405	1.406	1.399	1.416	1.390	1.423	1.405
1961	1.366	1.380	1.356	1.359	1.348	1.414	1.379
1962	1.292	1.326	1.264	1.356	1.268	1.402	1.327
1963	1.266	1.258	1.162	1.305	1.170	1.385	1.260
1964	1.259	1.192	1.067	1.256	1.080	1.378	1.191
1965	1.236	1.139	1.007	1.212	1.012	1.351	1.138
1966	1.250	1.109	0.977	1.186	0.973	1.333	1.107
1967	1.255	1.095	0.961	1.174	0.949	1.328	1.091
1968	1.190	1.071	0.939	1.151	0.920	1.311	1.068

Table 3-6

SIMULATION RESULTS ([W2 : WO] / W1)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	1.506	-	-	-	-	-	-
1954	1.512	-	-	-	-	-	-
1955	1.542	1.558	1.558	1.561	1.556	1.560	1.558
1956	1.573	1.563	1.563	1.569	1.559	1.566	1.566
1957	1.572	1.551	1.550	1.561	1.546	1.556	1.553
1958	1.516	1.554	1.548	1.567	1.545	1.565	1.556
1959	1.503	1.551	1.542	1.564	1.540	1.563	1.553
1960	1.496	1.537	1.523	1.552	1.519	1.557	1.540
1961	1.447	1.507	1.475	1.529	1.471	1.546	1.511
1962	1.382	1.447	1.370	1.485	1.381	1.534	1.454
1963	1.346	1.373	1.257	1.431	1.273	1.520	1.383
1964	1.340	1.299	1.147	1.376	1.172	1.513	1.305
1965	1.323	1.252	1.090	1.342	1.103	1.494	1.257
1966	1.336	1.227	1.063	1.323	1.066	1.484	1.231
1967	1.327	1.215	1.049	1.315	1.044	1.482	1.220
1968	1.286	1.195	1.029	1.298	1.018	1.474	1.200

Table 3-7

SIMULATION RESULTS (PO2/PO1)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	1.363	-	-	-	-	-	-
1954	1.218	-	-	-	-	-	-
1955	1.230	1.245	1.244	1.246	1.244	1.246	1.286
1956	1.349	1.312	1.312	1.313	1.310	1.314	1.275
1957	1.336	1.310	1.310	1.313	1.307	1.313	1.263
1958	1.243	1.262	1.260	1.262	1.256	1.264	1.253
1959	1.241	1.213	1.211	1.218	1.206	1.221	1.244
1960	1.185	1.180	1.174	1.185	1.168	1.191	1.231
1961	1.140	1.142	1.126	1.153	1.120	1.165	1.204
1962	1.098	1.086	1.042	1.107	1.050	1.138	1.160
1963	1.059	1.019	0.960	1.052	0.964	1.105	1.106
1964	1.040	0.960	0.823	1.003	0.890	1.084	1.046
1965	1.000	0.919	0.828	0.971	0.834	1.060	1.002
1966	0.962	0.891	0.801	0.938	0.799	1.039	0.975
1967	0.938	0.865	0.776	0.918	0.769	1.018	0.956
1968	0.892	0.843	0.754	0.896	0.742	0.997	0.935

Table 3-8

SIMULATION RESULTS (YD)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	4081.7	-	-	-	-	-	-
1954	4552.5	-	-	-	-	-	-
1955	5160.5	4343.0	4345.1	4328.2	4342.5	4343.3	4362.9
1956	5627.8	5018.3	5023.1	4946.4	5018.1	5018.6	5020.6
1957	6217.4	5734.3	5746.8	5558.0	5733.0	5735.3	5682.2
1958	6652.4	6452.2	6520.5	6166.8	6449.1	6431.1	6397.7
1959	7460.5	7075.4	7259.7	6741.1	7070.6	7063.5	7088.3
1960	8634.7	8168.1	8505.8	7744.9	8174.7	8124.2	8220.6
1961	10160.4	9904.4	10428.5	9396.2	9917.9	9828.1	10039.7
1962	11656.0	12008.3	12755.3	11411.7	12007.7	11883.4	12267.4
1963	13595.6	14192.1	15140.1	13494.5	14174.5	14032.1	14622.3
1964	15583.1	16628.8	17791.9	15802.3	16582.4	16461.8	17295.5
1965	17628.8	19096.0	20412.4	18029.1	19028.6	18992.5	19966.3
1966	20205.3	21105.8	22475.9	19831.7	20992.1	21167.0	22103.7
1967	23636.3	23117.5	24656.6	21653.1	23012.7	23339.4	24294.4
1968	27380.9	25606.2	27282.5	23781.3	25412.6	25835.4	26809.2

Table 3-9

SIMULATION RESULTS (I1)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	130.2	-	-	-	-	-	-
1954	136.3	-	-	-	-	-	-
1955	133.1	122.1	122.1	122.0	122.1	122.1	122.0
1956	113.8	114.5	114.6	114.1	114.4	114.6	114.5
1957	101.0	112.3	112.3	111.2	112.1	112.4	112.5
1958	107.8	113.8	114.1	111.8	113.5	114.1	113.7
1959	96.5	117.3	118.2	114.3	116.8	117.7	116.7
1960	110.8	123.9	125.8	120.3	123.2	124.4	123.0
1961	145.0	134.1	136.6	129.9	132.7	134.9	133.1
1962	157.3	146.8	148.9	142.8	144.3	149.2	146.1
1963	196.9	183.6	184.9	179.9	178.3	190.1	183.6
1964	231.9	220.0	217.7	217.6	210.3	234.1	220.8
1965	268.0	256.1	249.0	255.4	239.7	280.3	257.9
1966	314.8	290.0	277.9	291.1	266.2	326.1	292.9
1967	344.5	321.4	304.4	323.9	289.9	370.3	325.3
1968	376.0	352.1	330.6	355.7	312.6	413.3	356.6

Table 3-10

SIMULATION RESULTS (I2)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	246.8	-	-	-	-	-	-
1954	231.3	-	-	-	-	-	-
1955	221.9	217.7	212.8	212.1	212.8	212.7	256.3
1956	335.5	284.2	284.9	277.8	284.3	284.0	240.3
1957	532.1	352.1	353.0	330.7	352.3	351.9	278.6
1958	367.7	425.7	431.2	392.1	425.9	424.0	432.7
1959	458.2	388.2	405.2	352.9	388.5	383.2	465.9
1960	571.2	463.1	495.4	425.2	466.1	455.7	608.8
1961	830.4	586.0	639.0	538.8	592.9	572.0	822.0
1962	742.4	746.0	832.4	687.5	755.7	715.2	1120.6
1963	858.0	895.9	1008.0	823.8	915.1	846.2	1465.6
1964	1005.2	1063.5	1222.9	975.2	1092.2	989.6	1833.4
1965	873.7	1185.7	1364.3	1074.6	1232.4	1109.1	2065.2
1966	987.3	1290.9	1474.0	1156.3	1342.4	1209.8	2301.5
1967	1367.9	1334.8	1520.8	1181.0	1388.8	1253.8	2524.0
1968	1432.9	1403.6	1608.6	1227.1	1466.0	1323.2	2693.8

Table 3-11

SIMULATION RESULTS (X1)

	Actual values	Historical simulation	Experiment				
			1	2	3	4	5
1953	108.5	-	-	-	-	-	-
1954	138.8	-	-	-	-	-	-
1955	185.5	186.7	192.0	152.9	186.2	187.0	183.7
1956	191.7	221.5	218.5	155.8	220.3	222.5	225.4
1957	202.8	226.3	242.5	156.7	224.4	227.9	233.3
1958	232.6	201.8	287.8	165.4	199.3	206.2	198.2
1959	296.2	241.3	332.4	170.9	237.0	247.0	231.5
1960	281.1	264.9	370.7	171.3	257.1	271.8	253.2
1961	269.6	267.9	391.2	168.6	251.6	283.4	255.1
1962	257.6	253.4	365.0	159.0	230.0	292.4	242.7
1963	266.2	257.9	347.4	147.1	218.3	333.8	248.8
1964	304.2	260.9	301.6	134.3	207.0	385.0	246.3
1965	347.6	274.0	297.0	126.1	199.6	433.5	258.5
1966	386.7	285.9	315.0	121.4	199.7	476.0	269.3
1967	384.9	291.8	343.6	119.9	198.0	498.7	273.4
1968	425.0	326.4	368.8	116.5	215.5	570.1	305.6

Table 3-12

SIMULATION RESULTS (X2)

	Actual values	Historical simulation	Experiment 1	2	3	4	5
1953	325.5	-	-	-	-	-	-
1954	456.9	-	-	-	-	-	-
1955	571.1	579.5	591.8	500.1	579.5	579.5	566.2
1956	693.7	699.2	696.7	513.5	699.1	699.3	708.8
1957	766.7	781.9	822.4	534.1	781.7	782.1	808.9
1958	768.0	762.9	1007.5	578.2	762.6	763.3	769.3
1959	895.4	893.4	1240.2	629.3	892.9	894.1	873.7
1960	1062.8	1053.8	1509.0	677.5	1052.8	1054.7	1009.6
1961	1159.7	1193.4	1820.6	723.9	1191.2	1195.5	1128.0
1962	1370.2	1328.8	2183.3	770.9	1324.8	1334.4	1241.4
1963	1533.0	1591.6	2621.5	1224.3	1583.5	1604.1	1467.3
1964	1881.2	1936.2	3132.2	872.7	1922.0	1960.0	1768.3
1965	2434.6	2370.5	3731.3	922.8	2346.3	2407.2	2157.7
1966	2922.2	2810.5	4459.1	977.0	2776.4	2860.1	2549.1
1967	3138.8	3189.9	5352.9	1038.6	3147.0	3250.6	2868.4
1968	3957.0	3849.2	6406.7	1100.4	3793.3	3926.5	3444.0

These results reveal that large-scale industries are much more concentrated in those industries which produce capital and more sophisticated intermediate goods, while small-scale industries mainly produce final goods. In other words we can also characterize manufacturing industries as indigenous or modern by types of products.

The variables associated with the service sector are currently left as exogenous and no attempt has been made to model the monetary sector. Mining, construction, and miscellaneous manufacturing industry as well as the service sector are included in other industries (sector R) in the sequel.

The basic time series used in this study were compiled by the Japan Economic Research Center (JERC). More specifically, the series on the volume of imports and exports and their price indices are obtained from the *Trade Statistics* (Ministry of Finance). On the production side, the series on the volume of production and their price indices are obtained from the *Census of Manufactures* (Ministry of International Trade and Industry). Some of the series are depicted in the following figures. Figure 1 ~ figure 3 show the differentials of the growth rates of output, imports, and exports between the indigenous manufacturing sector (M1) and the modern manufacturing sector (M2). Figure 4 indicates the changes in price of products, while figure 5 depicts the behaviour of capital intensity, K/L. These figures suggest the following points:

i) Although the output and exports of the indigenous manufacturing industries continued to rise over time, its growth rate is much smaller than that of the modern manufacturing sector.

ii) From 1953 to 1960, the imports of the indigenous manufacturing products stagnated, but have shown growth since 1960.

iii) Figure 4 indicates that the changes in price of modern manufacturing products are very small compared with those of indigenous manufacturing products.

iv) The modern manufacturing sector's K/L is much higher than that of the indigenous manufacturing sector. That is to say, the modern manufacturing sector is capital-intensive compared with the indigenous manufacturing sector.

Figure 1

OUTPUT

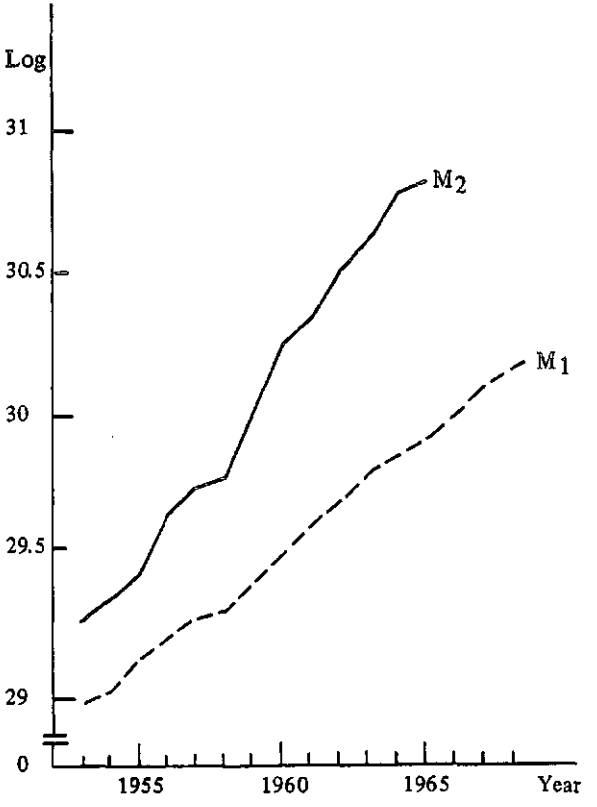


Figure 3

EXPORTS

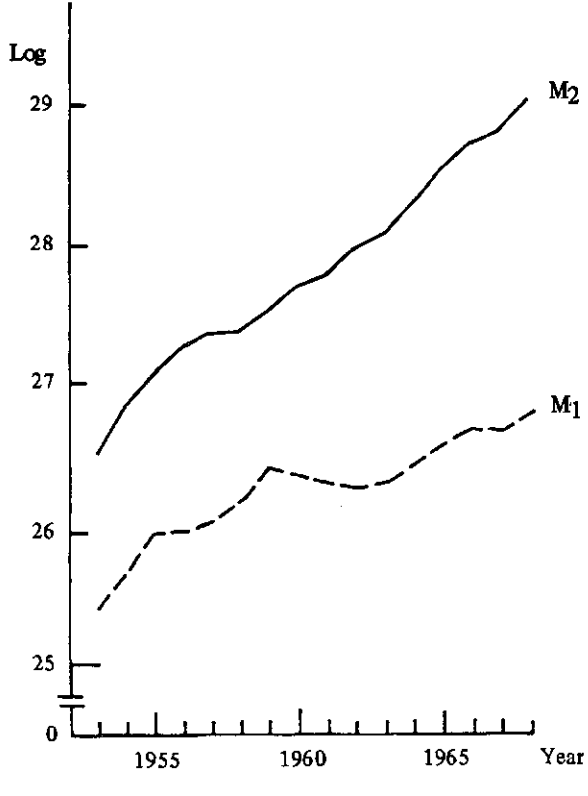


Figure 2

IMPORTS

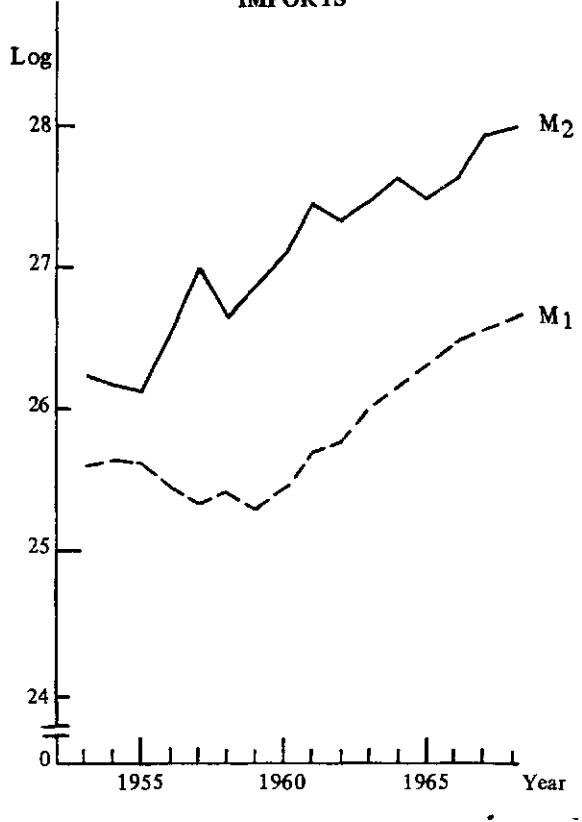


Figure 5

K/L

(Unit: 10 thousand yen, person)

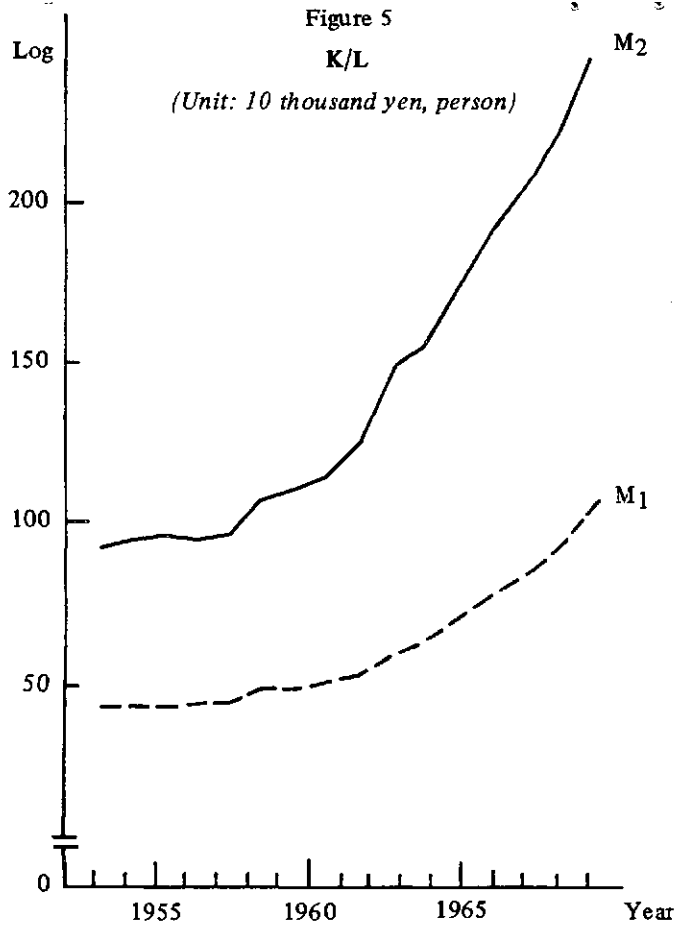
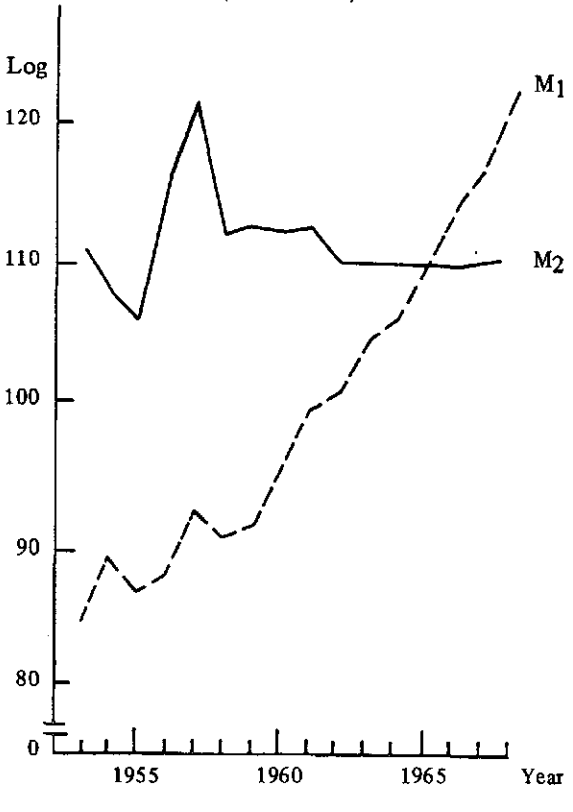


Figure 4

IMPLICIT PRICE DEFLATOR FOR OUTPUT

(1965 = 100)



B. THE STRUCTURE OF THE MODEL

The system includes thirty-five endogenous variables and thirty-three predetermined variables. The behavioural equations conveniently split into seven groups: production functions, domestic demand functions, investment functions, import functions, export functions, price determination equations and wage adjustment equations. Most of them were estimated by the 2SLS procedure.[59] The figures in parentheses beneath the parameter estimates are the absolute values of the corresponding t-ratios, dw is the Durbin-Watson statistics and $\hat{\sigma}$ is the standard error of estimate. The names of variables are as follows:

List of variables

Endogenous variables

SA	volume of production in sector A (1965 prices)
S1	volume of production in sector M1 (1965 prices)
S2	volume of production in sector M2 (1965 prices)
SO	volume of production in sector O (1965 prices)
DA	domestic demand for sector A (1965 prices)
D1	domestic demand for sector M1 (1965 prices)
D2	domestic demand for sector M2 (1965 prices)
DO	domestic demand for sector O (1965 prices)
X1	exports of sector M1 (1965 prices)
X2	exports of sector M2 (1965 prices)
IA	imports of primary products (1965 prices)
I1	imports of indigenous manufacturing products (1965 prices)
I2	imports of modern manufacturing products (1965 prices)
ΔK1	net investment in sector M1 (1965 prices)
ΔK2	net investment in sector M2 (1965 prices)
ΔKO	net investment in sector O (1965 prices)
PO1	implicit price deflator for S1 (1965 = 100)
PO2	implicit price deflator for S2 (1965 = 100)
POO	implicit price deflator for SO (1965 = 100)
W1	wages per employee in sector M1
W2	wages per employee in sector M2
WO	wages per employee in sector O
N1	employment in sector M1
N2	employment in sector M2
NO	employment in sector O
K1	net capital stock in plant and machinery in sector M1 (1965 prices)
K2	net capital stock in plant and machinery in sector M2 (1965 prices)

KO	net capital stock in plant and machinery in sector O (1965 prices)
YD	personal disposable income (1965 prices)
PC	implicit price deflator for consumption (1965 = 100)
Q	effective opening-to-application ratio
S	volume of total production (1965 prices)
P	implicit price deflator for S (1965 = 100)
N	employees in employment
ΔK	net domestic fixed capital formation (1965 prices)

Exogenous variables

NA	employment in sector A
NR	employment in all other industries
SR	volume of production in all other industries (1965 prices)
POA	implicit deflator for SA (1965 = 100)
IG	government net fixed investment (1965 prices)
PEIW	price index for world manufactured goods (1965 = 100)
PIA	implicit deflator for IA (1965 = 100)
PI1	implicit deflator for I1 (1965 = 100)
PI2	implicit deflator for I2 (1965 = 100)
ΔKA	net investment in sector A (1965 prices)
ΔKR	net investment in all other industries (1965 prices)
IN	official discount rate
PI	import price index (1965 = 100)
PIM	import price index of mining products (1965 = 100)
PP	price index of public utilities charges (1965 = 100)
NL	total labour force
XA	exports of sector A (1965 prices)
TWMR	world manufacturing export index (1965 = 100)
TIME	trend, in years, beginning with unity in 1954
DUMMY	dummy variable which accounts for the changes in import control policy by means of import collateral adjustments adopted until the early 1960s, equal to one before 1960, zero thereafter.

a) ***Production functions***

We assume that output in each sector is produced by labour and capital and that the production relations can be approximated by equations of the Cobb-Douglas type. If production functions are homogeneous of degree one, they are also written with labour productivity as a function of capital input per labour input. The estimated production functions incorporating technical changes which are assumed to take place at a constant percentage rate are as follows:

$$(\log S1 - \log N1) = \underset{(16.326)}{4.3841} + \underset{(2.955)}{0.2243}\ \{\log(K1 + K1_{-1}) / 2 - \log N1\} + \underset{(5.791)}{0.02786}\ \text{TIME}$$

$$\hat{\sigma} = 0.01783, \qquad dw = 0.998$$

$$(\log S2 - \log N2) = \underset{(2.385)}{3.1650} + \underset{(1.209)}{0.3744}\ \{\log(K2 + K2_{-1}) / 2 - \log N2\} + \underset{(2.845)}{0.06452}\ \text{TIME}$$

$$\hat{\sigma} = 0.05602, \qquad dw = 1.484$$

$$(\log SO - \log NO) = \underset{(3.118)}{1.9860} + \underset{(3.707)}{0.4221}\ \{\log(KO + KO_{-1}) / 2 - \log NO\} + \underset{(10.233)}{0.04706}\ \text{TIME}$$

$$\hat{\sigma} = 0.01728, \qquad dw = 1.321\ .$$

An apparent limitation of the estimated production functions is the omission of variables describing fluctuations in the rate of utilization of capacity. In Ueno-Kinoshita [11] the rate of capacity utilization has been taken account of, but treated as an exogenous variable. This is because rates of utilization have been assumed to be decided through cartel actions by trade associations and administrative measures by government over pre- and postwar periods. However, this assumption does not seem suitable for our model, since it includes small-scale industries as well as large-scale industries.

It is clear that there is a marked difference in the rate of technical progress between the indigenous and modern manufacturing sectors. The estimated rate of technical change in the indigenous manufacturing sector is about 2.79% per year, which is much lower than 6.45% in the modern manufacturing sector and 4.71% in the social overhead sector. In fact it is lower than the values of the rate of technical progress for the primary sector estimated by Ueno and Kinoshita [11] and the Economic Planning Agency [1].

Finally, it should be noted that the level of production is determined through the market clearing conditions, while production functions describe the determination of employment.

b) *Domestic demand functions*

Domestic demand for the non-primary sector is considered to be a function of personal disposable income, a ratio of the implicit deflator for the sector's products to be implicit deflator for private consumption, total net investment in the private sector, capital formation by the public sector and government

consumption. On the other hand, domestic demand for the primary sector was related to personal disposable income and price index of primary products. Personal disposable income is deflated by the implicit price deflator for consumption in each equation. Deleting insignificant variables, we have the estimated functions:

$$\log DA = \underset{(40.423)}{6.6738} + \underset{(8.479)}{0.4949}\ (\log YD - \log PC) - \underset{(1.304)}{0.1261}\ \log POA$$

$$\hat{\sigma} = 0.02063, \qquad dw = 2.133$$

$$\log D1 = \underset{(24.938)}{5.2044} + \underset{(7.154)}{0.5910}\ (\log YD - \log PC) + \underset{(3.319)}{0.1101}\ \log DK$$

$$- \underset{(4.460)}{0.9950}\ (\log PO1 - \log PC)$$

$$\hat{\sigma} = 0.01519, \qquad dw = 2.796$$

$$\log D2 = \underset{(12.429)}{2.0171} + \underset{(6.840)}{1.0961}\ (\log YD - \log PC) + \underset{(3.176)}{0.2825}\ \log DK$$

$$\hat{\sigma} = 0.04629, \qquad dw = 2.499$$

$$\log DO = \underset{(19.189)}{2.4195} + \underset{(13.820)}{1.0144}\ (\log YD - \log PC) + \underset{(2.319)}{0.0951}\ \log (DK + IG)$$

$$- 0.2671\ (\log POO - \log PC)$$

$$\hat{\sigma} = 0.01633, \qquad dw = 2.215\ .$$

The estimated income elasticity of modern manufacturing products is much higher than that of indigenous manufacturing products. Comparing the expenditure elasticities for about 100 goods and services, Rosovsky and Ohkawa [9] concluded that *indigenous* are generally lower than *intermediate*, and *intermediate* are lower than *modern*. They predicted that with rising incomes the demand for modern commodities was expected to outstrip the other groups. The estimates in our model are consistent with this view of the consumer expenditure pattern. It is clear that the large income elasticities for the modern manufacturing sector contributed to a higher rate of growth of this sector than the growth of the whole economy.

c) *Investment functions*

All the investment equations estimated are of the "stock-adjustment" type and the equation for the indigenous manufacturing sector includes interest rate as a cost factor. We will focus our attention on the expansion of private non-dwellings fixed investment in the non-primary sector, while private fixed investment in the primary sector is currently assumed exogenous. The estimated functions are:

$$\Delta K1 = \underset{(4.358)}{0.2050\ S1_{-1}} + \underset{(6.867)}{0.7580\ \Delta K1_{-1}} - \underset{(2.690)}{6.5215\ IN}$$

$$\hat{\sigma} = 28.794, \quad dw = 2.030$$

$$\Delta K2 = \underset{(4.449)}{0.1929\ S2_{-1}} + \underset{(7.242)}{0.7491\ \Delta K2_{-1}}$$

$$\hat{\sigma} = 196.067, \quad dw = 2.180$$

$$\Delta KO = \underset{(2.328)}{0.7148\ SO_{-1}} + \underset{(6.109)}{0.8086\ \Delta KO_{-1}}$$

$$\hat{\sigma} = 79.229, \quad dw = 2.848\ .$$

First it should be noted that the desired level of fixed investment is determined by only exogenous and predetermined variables. Therefore, these equations are estimated by ordinary least squares. Unfortunately the results are much less than satisfactory; in particular, the implied lags in investment behaviour seem rather long.

Since there is much bank borrowing and comparatively less internal financing for investment in Japan, the rate of interest might be considered an important variable. However, our results indicate that investment by the modern manufacturing sector and the social overhead sector are not affected by the level of interest rate. The estimated coefficients of the interest rate in the equations for these sectors were not statistically significant and were dropped from the equations.

d) *Import functions*

The import functions were made functions of the levels of domestic demand for the sector, implicit price deflators for imports and domestic prices. As in the case of indigenous manufacturing products, we find that the estimated coefficients of the price variables are not statistically significant. Therefore, we dropped these variables from the equation and included the lagged dependent variable and a dummy variable which represents the changes in import control

policy by means of import collateral adjustments adopted until the early 1960s. However, the estimated coefficient of the dummy variable is not statistically significant and leaves room for improvement. The empirically estimated functions are:

$$\log IA = -5.83247 + 1.4644 \log DA - 0.7662 (\log PIA - \log POA)$$
$$(1.589) \quad (3.457) \quad (3.030)$$
$$\hat{\sigma} = 0.05686, \quad dw = 2.146$$

$$\log I1 = -1.0445 + 0.2899 \log D1 - 0.1344 DUMMY + 0.7290 \log I1_{-1}$$
$$(5.780) \quad (1.969) \quad (1.094) \quad (5.488)$$
$$\hat{\sigma} = 0.0977, \quad dw = 1.563$$

$$\log I2 = -21.3566 + 0.9490 \log D2 + 4.9573 \log PO2 - 0.9042 \log PI2$$
$$(5.780) \quad (25.470) \quad (4.137) \quad (1.673)$$
$$\hat{\sigma} = 0.0621, \quad dw = 2.586 .$$

The percentage change of imports associated with a 1% change of domestic demand are 1.070 for indigenous manufacturing products and 0.949 for modern manufacturing products.[60] Although these estimates are not statistically different from one another, it should be noted that the value is smaller than unity for modern manufacturing products. Generally speaking, the rapid rise in manufacturing has brought about a faster increase in imports of machinery and equipment, and the trade gap caused by the increased imports of capital goods has reduced the pace of economic growth. The estimated elasticities suggest that import substitution has occurred for modern manufacturing products, which has allowed Japan to escape from this trap.

e) ***Export functions***

Exports of manufacturing products are assumed to be functions of the world manufacturing export index and the relative price variable, while exports of primary products are taken to be exogenous to the system. Unfortunately the figures on the price for world trade were not available in an industry classification comparable with ours; consequently, the relative price variables are expressed as the price index of Japanese exports for each group of industries divided by the price index of world aggregated manufacturing exports index.

The empirical estimates of the export functions specified in this way are:

$$\log X1 = 5.0642 + 1.9053 \log TWMR - 2.8690 (\log PO1 - \log PEIW)$$
$$(3.035) \quad (4.425) \quad (2.370)$$
$$\hat{\sigma} = 0.10443, \quad dw = 0.935$$

$$\log X2 = \underset{(0.161)}{0.1596} + \underset{(4.033)}{1.4020} \log TWMR - \underset{(8.460)}{0.6162} (\log PO2 - \log PEIW) + \underset{(2.233)}{0.3134} \log X2_{-1}$$

$$\hat{\sigma} = 0.02734, \qquad dw = 2.750 .$$

If we put $X2 = X2_{-1}$ in the export equation for modern manufacturing products, we get a sort of long-run elasticity of exports with respect to the foreign activity variable, which turns out to be 2.04. Thus the elasticity of exports with respect to the foreign activity variable is almost 2 in either equation, which seems to be another important factor that makes it possible for the Japanese economy to sustain a high rate of economic growth without causing secular balance-of-payments difficulties.

f) ***Price determination functions***

The price determination functions estimated here, which are similar to those in use elsewhere, are basically mark-up equations that relate the index of price of final output to the earnings index and the import price index. Both the implicit price deflator for aggregated imports (PI) and the import price index of mining products (PIM) were tried as import price terms. As for the modern manufacturing sector and the social overhead sector, PIM performed better than PI. The empirical results are:

$$\log PO1 = \underset{(7.561)}{2.6073} + \underset{(24.364)}{0.2676} \log W1 + \underset{(1.391)}{0.0910} \log PI$$

$$\hat{\sigma} = 0.01529, \qquad dw = 1.657$$

$$\log PO2 = \underset{(11.353)}{3.2342} + \underset{(2.856)}{0.0434} \log W2 + \underset{(5.036)}{0.2403} \log PIM$$

$$\hat{\sigma} = 0.01889, \qquad dw = 1.155$$

$$\log POO = \underset{(9.185)}{2.5527} + \underset{(17.381)}{0.2642} \log WO + \underset{(1.778)}{0.0815} \log PIM$$

$$\hat{\sigma} = 0.01839, \qquad dw = 1.215 .$$

It should be noted that the equation for the modern manufacturing sector has a weak wage term, whereas the equations for other sectors have highly significant wage elasticities.

g) *Wage adjustment functions*

The estimated forms of the wage adjustment functions are based on the Phillips Curve, which relates changes in wage rates to excess demand in the labour market. As a measure of labour market tightness we took effective opening-to-application ratio. Changes in the implicit price deflator for consumption are also introduced as a factor of cost-of-living adjustments. The actual estimated equations are:

$$\log W1 - \log W1_{-1} = \underset{(2.611)}{0.03222} + \underset{(2.704)}{0.9277}\,(\log PC - \log PC_{-1}) + \underset{(1.927)}{0.05306}\,1/Q$$

$$\hat{\sigma} = 0.01978, \qquad dw = 1.895$$

$$\log W2 - \log W2_{-1} = \underset{(3.077)}{0.04298} + \underset{(1.503)}{0.5834}\,(\log PC - \log PC_{-1}) + \underset{(1.228)}{0.03826}\,1/Q$$

$$\hat{\sigma} = 0.02239, \qquad dw = 2.479$$

$$\log WO - \log WO_{-1} = \underset{(3.114)}{0.03658} + \underset{(2.530)}{0.8262}\,(\log PC - \log PC_{-1}) + \underset{(1.365)}{0.03577}\,1/Q$$

$$\hat{\sigma} = 0.01883, \qquad dw = 1.665\ .$$

Although the excess demand variable was not statistically significant for the modern manufacturing sector and the social overhead sector, we retained it in the equations because theory suggests it belongs there. The results indicate that changes in labour market tightness have greater effects on the wage changes in the indigenous manufacturing sector than on the wage changes in the modern manufacturing sector. On the other hand the results show no systematic pattern in the effects of changes in the price level.

We now present three technical equations, four market equilibrating equations, and seven identities required to close the model.

a) *Technical equations*

$$\log Q = - \underset{(4.249)}{0.7186} - \underset{(8.793)}{16.466}\,\frac{N - NL}{NL}$$

$$\hat{\sigma} = 0.2212, \qquad dw = 0.808$$

$$\log YD = - \underset{(22.648)}{5.6286} + \underset{(2.064)}{0.4647}\,\log V + \underset{(2.236)}{0.5154}\,\log V_{-1}$$

$$\hat{\sigma} = 0.03546, \qquad dw = 0.949$$

$$\log PC = -\underset{(7.742)}{1.8188} + \underset{(2.416)}{0.4376}\ \log P + \underset{(6.037)}{0.9549}\ \log PP$$

$$\hat{\sigma} = 0.02295, \qquad dw = 0.539 .$$

b) *Market equilibrium conditions*

$$DA = SA + IA - XA$$
$$D1 = S1 + I1 - X1$$
$$D2 = S2 + I2 - X2$$
$$DO = SO .$$

c) *Identities*

$$K1 = K1_{-1} + \Delta K1$$
$$K2 = K2_{-1} + \Delta K2$$
$$KO = KO_{-1} + \Delta KO$$
$$S = SA + S1 + S2 + SO + SR$$
$$P = (POA*SA + PO1*S1 + PO2*S2 + POO*SO + POR*SR) / S$$
$$N = NA + N1 + N2 + NO + NR$$
$$\Delta K = \Delta KA + \Delta K1 + \Delta K2 + \Delta KO + \Delta KR .$$

C. THE DYNAMIC PROPERTIES OF THE MODEL

The model can now be simulated as a complete system. We begin with an *ex-post*, or "historical", simulation. The simulation begins in 1954 and runs forward until 1968. Given historical values in 1954 as initial conditions for the endogenous variables, and given historical series for the exogenous variables, the model is solved using a Gauss-Seidel algorithm. Although it is often pointed out that solution problems are asociated with annual systems, there has been no problem in obtaining convergence and the simulated series seem to reproduce the general behaviour of the actual series. The results of the historical simulations are summarized in table 3.

We can also use our model to examine the economic consequences that would have resulted from changes in the rate of growth of some exogenous variables. Although the analysis in the previous section provides a partial insight into the impact of these changes, it takes no account of the fact that variables interact with each other across equations and over time. The full dynamic structure of the model becomes evident only if the model is solved simultaneously through time. We performed the following five simulation

experiments. The first four experiments correspond to changing the value of only one exogenous variable, while the last experiment corresponds to changing two exogenous variables at a time.

Experiment 1: In this experiment, the rate of growth of world manufacturing export is set at 9%, while the rates of growth of all other exogenous variables are set at their historical rates of growth.

Experiment 2: The second experiment is the same as the first, except that the rate of growth of world manufacturing export is set at 3%.

Experiment 3: In this experiment the labour supply (NL) is assumed to grow at 3% per year, while the other exogenous variables are assumed to follow the same paths as in the historical simulation.

Experiment 4: The fourth experiment is the same as the third, except that the rate of growth of the labour supply is set at 1% per year.

Experiment 5: In this last experiment it is assumed that the aggregated import price index (PI) grows at 1% per year, import price index of mining products grows at 3% per year, and all other exogenous variables grow at their historical rates of growth.

The simulations presented here are essentially mechanical ones. For example the actual values of NA and NR are used, while the rate of growth of NL is changed. Fully realistic simulations need to take account of the existence of the unspecified relationships among these exogenous variables. The main results of these experiments are shown in table 3. Since the central issue of this chapter is the strategy and mechanism of industrialization in the semi-industrialized phase, in particular the process of the reallocation of resources from the indigenous manufacturing sector to the modern manufacturing sector, the results are shown mainly in terms of the ratio between the indigenous manufacturing sector and the modern manufacturing sector.

The results of all these experiments indicate that output grows faster in the modern manufacturing industries than in the indigenous manufacturing industries (table 3-1). On the other hand the ratio of N2 to N1 increased up to 1964, and began to decrease (table 3-2). Comparing the third and fourth experiments in table 3-2, it can be seen that a more rapid growth of labour supply results in slower growth in S2/S1 and N2/N1. Similarly a more rapid growth in world manufacturing exports leads to more rapid growth in labour demand, which in turn results in greater increases in S2/S1 and N2/N1. These results indicate that the indigenous manufacturing sector contributed much to the absorption of the surplus labour force. The reason for this effect is, of course, that the estimated coefficient of capital input per man in the production function is greater for the modern manufacturing sector than for the indigenous manufacturing sector, namely that the input coefficients demonstrate less labour-absorptive capacity in the modern manufacturing industries. In addition, these phenomena are more apparent if the modern manufacturing sector and the social overhead sector are aggregated together (table 3-3 and table 3-4).

Although more rapid growth in S2/S1 for the first and third experiments results in a decrease in PO2/PO1 (table 3-7), which might promote import

substitution with respect to modern manufacturing products (secondary import substitution), imports of modern manufacturing products grow faster in the first and third experiments than in the second and the fourth (table 3-10). This is because more rapid growth of the modern manufacturing sector leads to a greater increase in imports of machinery and equipment. In other words, the indigenous manufacturing sector plays an important role in the efficient use of capital goods.

The results of the fifth experiment are also presented in table 3. The increases in the rates of growth of PI and PIM result in a smaller decrease in PO2/PO1, which in turn causes export of modern manufacturing products to decrease (table 3-12). Furthermore the import of modern manufacturing goods increases drastically, which might increase the deficit in the balance of trade. Thus it might be said that Japan considerably benefited from the stability of the prices of imported goods during her semi-industrialized phase.

The results in table 3-5 indicate that the wage differential in manufacturing (if we take the ratio of wages in the modern manufacturing sector to wages in the indigenous manufacturing sector) which was 1.4 in 1955 narrowed in 1968 for all the experiments. In 1968 the differential was wider for experiments 2 and 4 than for experiments 1 and 3, which implies that wage differentials are wider when a labour surplus situation prevails.

Table 3-5 also shows that wage differentials remained almost stable up to 1960, and then began to narrow rapidly. This is in accordance with the changes in N2/N1 presented in table 3-2. Therefore wage differentials seem to narrow when the demand for labour in the modern manufacturing sector is more active.

D. SUMMARY

It has been shown that in the framework developed in this chapter: 1) There is a marked difference in the rate of technical progress between the indigenous and modern manufacturing sectors. 2) The rapidity of the rate of technical progress in the modern manufacturing sector contributes to promote import substitution with respect to modern manufacturing products. Thus, as stated in section 2, the estimated percentage change of imports associated with 1% change of domestic demand is smaller than unity for modern manufacturing products, which seems to be the most important factor that makes it possible for the Japanese economy to sustain a high rate of economic growth without causing serious balance-of-payments difficulties. 3) As was pointed out in the previous section, the constancy of the prices of imported goods is another important factor that made Japan succeed in escaping from serious balance-of-payments difficulties. 4) It is changes on the demand side that have in the main caused changes in the structure of Japanese industries. That is the estimated income elasticity of modern manufacturing products is much higher than that of indigenous manufacturing products. Thus the centre of gravity of the industrial sector has gradually shifted in the direction of the modern manufacturing sector. 5) The indigenous manufacturing sector contributed both to greater employment and to

the efficient use of capital goods. 6) In the phase of the rapid expansion of the modern manufacturing sector wage differentials between modern and indigenous manufacturing sectors narrowed more rapidly.

It is, of course, true that the industrialization strategy of semi-industrialized countries with richer natural resources, such as Latin American countries differs from that of East Asian countries. However, our quantitative investigations of Japan's postwar economy have thrown some light upon many leading development issues common to all the semi-industrialized countries.

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Chapter 3

MINERALS TRADE AND ECONOMIC CO-OPERATION: THE CASE OF IRON ORE

Introduction

Stimulated by the growth of the world economy, trade in mineral resources expanded rapidly in the years following World War II, and especially after the Korean conflict. It brought forth substantial benefits for both the exporting and importing countries. Despite the geographical distance, the minerals trade between Latin America and Japan offers one such example.

The interests of the exporting countries have not always coincided with those of the importing countries. However, conflicts were obscured by rapid trade expansion and only surfaced after the oil price was raised by the Arab nations in late 1973 and the worldwide recession set in. The sluggish demand for mineral resources and the suspension of many new mining projects prompted both the exporting and importing countries to a re-orientation of their respective resource policies.

The economic relations between Latin America and Japan in the realm of mining possess a special feature which cannot be found in other fields. The mining industry in Latin America generally has a high level of international competitiveness, and mineral imports are of vital importance for Japan whose economy is intrinsically geared to the processing trade. The trade in mineral resources, thus, forms one of the strongest ties between the two regions. It has been considered that there would be little need for scope for elements of economic co-operation to be introduced into mining since commercial transactions are well maintained between the Japanese demand industries and the international mining companies in charge of mining development and operations.

With the upsurge of resource nationalism, many developing countries now contemplate autonomous economic development based on the resources with which they are abundantly endowed by actively participating in their development. Japan can no longer consider the relationship with these resource-rich developing nations solely from the standpoint of the secure procurement of mineral resources. Given the fundamental changes in the international environment, Japan must draw up mineral import policies that enable these

countries to maximize the contribution of the mining sector to the development of their economies. And without conscious efforts on its part in this direction, Japan cannot hope for stable mineral imports. In other words, elements of economic co-operation have become necessary in addition to conventional commercial transactions between the Japanese demand industries and the resource-endowed countries.

Mineral resources differ widely in their geographical distribution, the degree of mining development, the market conditions of the world, and so forth. In this paper, focusing on the iron ore trade between Latin America and Japan so as to direct our attention, we explore the desirable forms of economic co-operation in the mineral trade in years to come. By comparing Japanese experience in Latin America with that in Australia, it will be argued that a new form of economic co-operation is possible with technological-*cum*-institutional innovation in iron ore mining and trade.

Iron ore is relatively abundant in the world and its overall supply constraint is less acute than those of petroleum and non-ferrous minerals. Moreover, since iron ore mines have been developed mainly by private means, their development has been rarely discussed in relation to economic co-operation. However, iron ore is much more important than non-ferrous minerals. Japan's imports of iron ore are more than twenty times higher in volume, and five times higher in value, than those of non-ferrous minerals; iron ore is of similar importance to the exporting countries. Its significance is greater still when the impact on the industrialization of the developing countries and the problems of international readjustments of industrial structures are taken into consideration, in view of the importance of the production and trade of pig iron, crude steel, steel, and semi-finished products made from iron ore. This will adequately explain why problems related to iron ore are discussed here.

A. THE PROSPECT FOR IRON ORE TRADE

In the twenty-year period from 1950 through 1970, world steel production trebled. The trade in iron ore —its principal material input— increased much more rapidly. This is because the steel industries in the United States and Western Europe gradually developed mines in remote locations abroad such as South America and Africa and imported iron ore therefrom as the domestic and adjacent foreign supply sources were depleted. With the rapid increase of steel production, the Japanese steel industry —belatedly recovered from wartime destruction— then became the promoter of the world iron ore trade by extending its principal import sources from the neighbouring small- and medium-scale mines in Southeast Asia to remote, large-scale mines in Australia and South America (see table 1).

In the case of Brazil, it is Japan's remotest supply source of iron ore. But the disadvantage of long haulage is lessened by triangular shipping arrangements utilizing ore/oil carriers: a cargo boat carrying iron ore from Brazil to Japan across the Atlantic and Indian Oceans transports petroleum from the Middle East to Europe, rather than directly going back to Brazil in ballast, thereby

Table 1

JAPAN: IMPORT SOURCES OF IRON ORE, SELECTED YEARS

(Thousands of wet tons, per cent)

	1960	1965	1970	1973	1978
Australia	0	210	36 577	64 239	52 626
	(0.0)	(0.5)	(35.9)	(47.7)	(45.9)
Brazil	355	915	6 779	12 821	20 815
	(2.4)	(2.4)	(6.6)	(9.5)	(18.2)
Other South America (Chile, Peru, Venezuela)	882	11 461	15 739	14 626	8 716
	(5.9)	(29.6)	(15.4)	(10.9)	(7.6)
India and Southeast Asia	11 366	18 353	24 490	22 730	18 062
	(76.5)	(47.3)	(24.0)	(16.9)	(15.8)
Africa	294	2 652	11 026	12 849	7 509
	(2.0)	(6.8)	(10.8)	(9.5)	(6.5)
North America and other	1 964	5 178	7 386	7 411	6 917
	(13.2)	(13.4)	(7.2)	(5.5)	(6.0)
Total	14 861	38 769	101 997	134 676	114 645
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Source: Japan Iron and Steel Federation, *Tekkō Tōkei Yōran*, 1972 and 1979.
Note: Figures in brackets are percentages of total.

increasing hold usage and economizing freight costs. Until 1974 when the increase of the petroleum price made the long-distance voyage costlier, the CIF price of Brazilian ore was in fact the lowest in Japan (see table 2).

Unlike petroleum or non-ferrous minerals, world iron-ore reserves are relatively abundant and no serious physical constraint affects supplies. In addition, since the latter half of the 1970s, steel production in Japan, the United States, and Western Europe has stagnated, the demand for iron ore diminished, and the situation of surplus market supply continued. This does not mean, however, that secure imports of iron ore do not deserve any serious consideration in Japan.

First, dissatisfaction is expressed by the exporting countries with the fact that profits from the rapid export expansion of iron ore of the 1960s have disappeared. Furthermore, with the upsurge of resource nationalism, iron-ore exporting countries demand a greater share of the profits derived from the trade. Their insistence on an increase in the iron-ore export price and local processing before export for higher value added illustrates this trend.

Secondly, demand for iron ore is not independent from supply. In a situation such as the present in which world iron-ore demand is stagnant and in which a supply surplus prevails, expansion of existing mines and the

Table 2

JAPAN: IRON ORE IMPORT PRICE (CIF)

Year	Australia	Brazil	Whole area
1966	12.10	13.50	13.13
1967	11.75	12.36	12.66
1968	11.86	11.65	12.23
1969	11.77	11.01	11.64
1970	11.52	11.26	11.84
1971	11.12	11.03	11.58
1972	11.11	10.72	11.43
1973	12.10	11.65	12.26
1974	14.32	13.58	14.62
1975	15.84	16.77	16.68
1976	16.67	17.61	17.43
1977	18.25	19.65	19.26

Source: Japan Iron and Steel Federation, *Tekkō Tōkei Yōran*, 1978.
Note: Figures are annual averages obtained by dividing import values by import quantities as calculated from Ministry of Finance, *Customs Statistics*.

development of new mines decline, while existing reserves are depleted. When demand for iron ore revives after a five or ten year slump, a serious ore shortage may emerge since the expansion of existing mines normally requires a five-year, and the development of new mines a ten-year, gestation period.

Thirdly, more than half of Japanese iron ore requirements in 1985 have already been met by long-term ore purchase arrangements and the rest is expected to be provided by the renewal of existing contracts without difficulty (see table 3). When the short-supply situation described above develops, however, the terms of contracts will turn against Japan, the ore price will be drastically raised, and the renewal of the contracts itself might become jeopardized. In such a situation, the required amount of iron ore may not be available.

Japan must continue the practice of the long-term ore purchase contracts as well as expansion of existing mines and the development of new mines abroad so as to be free from the adverse impact of short-term demand fluctuations and to stabilize the ore supply in the long run.

Japan must also take into account the burgeoning iron-ore demand of neighbouring newly industrializing countries in Asia in order to guarantee its own stable long-term ore supply. The import demand from these countries has already reached nearly one-fifth of Japanese demand and these countries are increasingly competing with Japan in the world iron ore market.

Given the prospective overall supply constraint of iron ore and the upsurge of resource nationalism, it is inevitable that the interests of the resource-sovereign countries loom larger in the negotiation of the terms of Japan's participation in mining development and of the long-term trade contracts.

Table 3

FORECASTS OF JAPAN'S IRON ORE IMPORT DEMAND
(1980 AND 1985)

(Thousands of tons)

	1980	1985
(1) Crude steel production	120 000-127 000	135 000-150 000
(2) Iron ore required	140 000-150 000	160 000-178 000
(3) Regional distribution of iron ore supply: total	150 000 (100.0)	178 000 (100.0)
Oceania	76 000 (51.0)	89 800 (50.4)
Atlantic Region (Brazil, etc.)	42 100 (28.1)	48 900 (27.5)
Africa	9 500 (6.3)	13 700 (7.7)
India and Southeast Asia	21 900 (14.6)	25 600 (14.4)
(4) Long-term contracts: total	125 830	93 520
Oceania	62 550	40 350
Latin America	45 590	39 090
Canada	5 350	5 000
Africa	8 680	7 280
India and Southeast Asia	2 660	1 880

Source: (1)-(3): Kaiji Sangyō Kenkyūjo, *Kaigai Shigen to Kaijō Yusō ni Kansuru Kenkyū Chōsa (II)* (Research Report on Overseas Resources and Shipping II), March 1978.
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B. JAPAN'S IRON-ORE IMPORT STRATEGIES

1. Collective ore purchase arrangements

The postwar recovery of the Japanese steel industry was initially slower than that of Western Europe. However, during the high-growth period beginning with the latter half of the 1950s, it became the most efficient in the world —comparable in scale to that of the EEC— by the introduction of new technologies and large-scale equipment. At the same time, the acquisition of the material inputs became one of the most important tasks of the Japanese steel industry. Its huge demand for iron ore could not be satisfied by imports from the traditional supply sources of India and Southeast Asian countries. As table 1 indicates, Japan now imports iron ore from all over the world including from mines located on the opposite side of the globe. Japan possessed no international mining companies nor did its steel companies have the capacity to develop captive mines abroad. Under these circumstances, Japan devised its unique strategies for iron-ore imports: collective ore purchase arrangements by major steel producers and trading firms, and the long-term ore purchase contracts.

The collective ore purchase arrangements originated in the founding of the Overseas Steelmaking Materials Committee. Faced with increases in the FOB ore price and freight rates caused by the bulk spot purchase in the hands of the Japanese trading companies, three major steel producers in Japan (Yawata Steel, Fuji Steel, and Nippon Kokan) formed the Committee which was later joined by the other four major steel producers. The Committee provided these seven steel companies with a place for policy co-ordination and collective action for the acquisition of the material inputs abroad. Composed of the president, the vice-president, and the executive general manager in charge of material imports of each member company, it carried out not only research and studies on overseas mining development, construction of ore carriers and overseas loading facilities, and so on, but also organized overseas survey teams and made the necessary prepartions for the negotiation abroad. The present principal supply sources in India, Brazil, Australia, etc., were collectively developed through this Committee.

Table 4 shows some of Japan's current import contracts for iron ore. Note that it includes only major contracts and those of the small- and medium-scale mines in India, Africa, etc., are not listed. Due to the incomplete data used, not all the items in the table are equally accurate. However, it will be sufficient for our present purpose of understanding the substance of Japan's import contracts and the extent of its equity participation. Based on this table, various methods of iron-ore import are explained below.

Japan makes use of three methods for its iron-ore imports: a) production sharing, b) plain long-term contracts, and c) long-term contracts with equity participation. In addition, there are two other methods —spot ore purchases and captive mines— which are of little significance in the Japanese case.

Under the production-sharing method, Japan finances the development and expansion of iron ore mines abroad and/or the improvement of loading facilities in the host country, and receives repayment in kind by the import of iron ore. This method was first introduced in the development of the Kiriburu mines in India in 1958 under a three-year contract. b) and c) are both long-term contracts, but they are distinguished by the presence or absence of Japanese equity participation. The extent of Japan's equity participation also differs widely from a low level of 5-10% to a high of nearly 50%. The duration of long-term contracts is normally 10 to 15 years with the price and quantities of the ore predetermined. The distinction between a), b) and c) are not so clear-cut since b) and c) may accompany the finance of mining development.

Normally seven major Japanese steel companies collectively conclude an ore purchase contract with each mine. The quantity each steel company purchases is clearly specified in the contract. Also present in the negotiation and the contract ar ten or so major Japanese trading firms as the import agents. Once the contract is signed, the rest is routine work for these trading companies and they earn commission fees from the ore imports. Thus, the principal task of the trading companies in this transaction resides before the conclusion of the contract. One or two trading companies search for a promising mine and negotiate with the mining company for its development or themselves participate in its development. At the same time, they make an offer to the Overseas Steelmaking Materials Committee and the major steel producers in

Table 4

JAPAN: IRON ORE IMPORTS THROUGH LONG-TERM CONTRACTS AND EQUITY PARTICIPATION

Mine	Mining company and annual production	Capital composition	Japan's investment and finance * Japan's import channels of long-term contracts	Japan's import contracts I. II. ... = No. of contracts mt = millions tons
1. Hamersley (Western Australia)	Hamersley Iron Pty., Ltd. 46 mt/yr (30 mt till 1978)	A$42 million (M) CRT 82.32% (L) Australian private capitals 11.48% (J) Steel mills (6), trading companies (2) 6.2%	In 1973, the Japanese group bought the share of Kaiser Steel (M) *Marubeni-Mitsubishi→ steel mills (6)	I. 1966~81→~90 total 65.5→156 mt II. 1969~79 total 40.0 mt III. 1969~78 total 15.0 mt IV. 1972~86→~90 total 10.5mt/yr→13.5mt/yr Pellets 1968~78 total 19.8 mt ±10% quantity option and price determined by the brick system
2. Newman (Western Australia)	Mt. Newman Mining Co., Pty., Ltd. 40 mt/yr Amax Pacific Sales Corp. (shipper)	(M) Amax 25% (M) CSR 30% (L) BHP 30% (J) Mitsui-C. Itoh 10%	Stock bought at the start *Mitsui-C. Itoh → steel mills (7)	I. 1969~84 total 100.0 mt III. 1969~78 total 37.5 mt V. 1970~80 total 60.0 mt IX. 1976~85 total 21.3 mt ±10% quantity option and price determined by the brick system
3. Goldsworthy (Western Australia)	Mt. Goldsworthy Mining Marcona International (shipper)	(M) Utah Development 33-1/3% (M) Mt. Tsa Mining 20% (M) Consol Gold Field 46-2/3%	None *Marubeni, Nissho Iwai and Mitsui→steel mills (7)	III. 1969~78 total 10.5 mt IV. 1970~79 total 29.5 mt ±15% option, three months prior notice, fixed price 1973, price increased in 1977

Table 4 (continued 1)

Mine	Mining company and annual production	Capital composition	Japan's investment and finance * Japan's import channels of long-term contracts	Japan's import contracts I. II. ... = No. of contracts mt = millions tons
4. Robe River (Western Australia)	Cliffs Western Australian Mining 19.8 mt/yr	(J) Mitsui 30% (M) Cliffs Western 30% (L) Australian capital 35% (J) Cape Lambert 5%	Equity share acquired as the managing import agent Equity share acquired in 1977 from Mt. Enid Iron by Shin Nittetsu, Sumitomo and Mitsui jointly (A$ 21 million) *Mitsui→steel mills (6)	I. Fine ore 1972~86 total 54.0 mt Pellets 1972~93 total 86.7 mt ±10% option, price determined by the brick system
5. Savage River (Western Australia)	Pickands Mather and Co. (operator)	(J) Dahlia Mining (Mitsui-Sumitomo) 50% equity evenly divided from the start (M, L) Northwest Iron Co. (PMI, U.S. and Australian capital) 50%	*Mitsubishi and Sumitomo→ steel mills (6)	1968~87 total 45.0 mt Ore price of Dahlia determined annually based on actual production cost; ore price of Northwest determined by Japanese pellet import price
6. Rio Doce (Minas Gerais, Brazil)	Cia Vale do Rio Doce (CVRD)	(L) Brazilian Government	None *Nissho Iwai→ steel mills (7)	I. 1966~80 total 50.0 mt II. 1967~78 total 30.5 mt III. 1971~78 total 22.4 mt IV. 1972~86 total 102.5 mt V. 1979~93 total 95.0 mt VI. 1979~93 total 85.0 mt ±10% option, price determined by the brick system

Table 4 (continued 2)

Mine	Mining company and annual production	Capital composition	Japan's investment and finance	Japan's import contracts
			° Japan's import channels of long-term contracts	I. II. ... = No. of contracts; mt = millions tons
7. NIBRASCO (Espírito Santo, Brazil)	NIBRASCO Pellet production 6 million tons per year All the pellet feed supplied by CVRD (1978/5~)	$50 millions (L) CVRD 2 550 (51%) (J) Japanese Government 2 450 (49%)	Investments by steel mills (6) Shortage fund from the consortium of 10 Japanese banks (interest on Euro-dollars plus 1.75%) °Nissho Iwai - steel mills (6)	1978~92 6.0 mt/yr In principle, price fixed based on cost plus adequate profit; actually at a level between the current pellet price for Europe and U.S.A., as the maximum, and 6% below such prevailing price (namely 95%) as the minimum
8. MBR (Minas Gerais, Brazil)	Mineracoes Brasileiras Reunidas Ore sold by CAEMI in areas other than Japan	1.5 billions Cr. CA 61% Japanese group 20%	$8.16 million investment by steel mills (6) and trading companies (4)	1973~88 total 150.0 mt 1977~ brick system ±10% quantity option
Aquas Claras Mine		(M, J, L) EBM 51% (m) Hanna Mining 49%	A Japanese director in MBR. Development fund partly from five Japanese trading companies supported by the consortium of Ex-Im Bank and commercial banks °C. Itoh and Mitsui-steel mills (6)	
9. SAMARCO (Minas Gerais, Brazil)	SAMARCO Utah International (shipper)	(L) Samitri 51% (M) Utah International 49%	None °Mitsubishi and Nissho Iwai - Kobe Seiko	1977~86 4.8 mt ±10% option, price linked to that of CVRD

Table 4 (continued 3)

Mine	Mining company and annual production	Capital composition	Japan's investment and finance * Japan's import channels of long-term contracts	Japan's import contracts I. II. ... = No. of contracts mt = millions tons
10. Marcona (Peru)	Hierro Peru (public corporation) Minapeco (shipper) 10 mt/yr (6.5 mt at present)	(L) Peruvian Government	None *Mitsui, Marubeni, Nissho Iwai→steel mills (6)	Seven-year contract (1976~83) made separately by six Japanese mills (totalled 2 million tons in 1979). Pellet and pellet feed. Prices adjusted every year to prices quoted for fine ores from Brazil and Australia.
11. Algarrobo Boqueron-chanal (Chile)	(L) Compañía del Pacífico	(L) Chilean Government	US$85 million loan for the construction of pellet plant to CAP by Mitsubishi, which will be repaid in pellet over ten years. 3.05 million tons stocked at the mine site under the foreign exchange loan system for emergency import, which will be transferred to Japan for 1979~81. *Mitsubishi-steel mills (5)	1978~87 total 32.2 mt
12. Romeral (Chile)	El Romeral Mine Pacific Ores and Trading B.V. (shipper)	Compañía de Acero del Pacífico, S.A. (CAP 55%, Inter. Muller. 45%)	None *Mitsubishi-steel mills (4)	1979/4~80/3 2 year total 5.0 mt ±10% mill option, price determined each year

Table 4 (concluded)

Mine	Mining company and annual production	Capital composition	Japan's investment and finance * Japan's import channels of long-term contracts	Japan's import contracts I. II. ... = No. of contracts mt = millions tons
13. Bailadila (India)	MMTC: Minerals and Metals Trading Corporation of India (shipper)		None *Okura Shoji - steel mills (8)	1971~79 total 61.3 mt ±10% option, price determined by annual negotiation
14. Mandori Pellets (Goa)	Mandori Pellets Ltd. Pellet feed supplied by Chowgule Lodingat Morurugoo Port (Chowgule)	(L) Indian national Bank (L) Chowgule (L) Indian private	Development fund for pellet plant construction and so on partly funded by loans from the 8 Japanese mills (US$15 million). Loan repaid in kind of pellet for 5 years (Product Sharing System). $2.15 per ton. *Okura Shoji and Mitsubishi- steel mills (6)	1979~90 total 18.3 mt ±10% option by joint consultation. Price revised every two years to be able to compete with Australian ores at Japanese port.
15. Iscor (Republic of South Africa) (Sishen Mine)	South African Iron and Steel Industrial Corp. Sishen-Salhdanha Railway		None *Mitsui, Mitsubishi, Nissho Iwai - steel mills (6)	
16. Carol Lake (Canada)	Iron Ore Company Canada (IOC) The Hanna Mining Co. (export agency) 33 mt/yr	(M) IOC invested by nine American mills, which purchase pellet in proportion to their investment shares.	None *Tomen - steel mills (6)	1973~87 total 75.0 mt ±10% option, price revised every five years → annual price damage (within ± 20%)

Source: *Iron Ore Manual, 1978 and 1979* (Tokio, Tex Report).

Note: (1) M, L, J in column on capital composition indicate multinational enterprise, local firm and Japanese firm, respectively.
(2) * in column on Japan's import contracts shows the co-ordinating trading companies only.
(3) mt signifies million tons.

Japan leading to a collective ore purchase contract. These trading firms then become the managing import agents of iron ore from the mine concerned. In the case of new mining ventures, the bulk purchase guarantee by the long-term contract of the Japanese steel mills can constitute collateral for the considerable funds needed for the initial investment. In many cases, the managing trading firms are asked by the mining company in charge to invest in a minor share of the venture. At the stage of signing the collective purchase contract, other Japanese trading companies which have transactions with Japanese steel producers are normally invited by the managing firms to join. When other trading firms bring up another ore purchase transaction from another mine, these firms (normally two or so in number) become the managing agents, settle the terms of contract and ask other trading companies to participate. This behaviour is motivated by risk aversion as well as profits sharing.

2. Merits and demerits of long-term contracts

Most of the Japanese iron ore trade in the near future will be conducted as in the past through long-term contracts, as they satisfy the needs of both the sellers and the buyers of iron ore and ensure the long-term stability of the transaction. However, they cannot cope with oversupply or shortage of iron ore due to cyclical fluctuations. In the latter half of the 1970s, Japanese steel producers tried to deal with the decrease in iron ore demand and the situation of oversupply by introducing flexibility into the execution of the long-term contracts with regard to the acceptance of ore far below the lower limit of the quantity option or the annual revaluation of the ore price. But the move left exporters considerably dissatisfied. Moreover, it culd lead to changes in the nature of the long-term contracts which might jeopardize stable long-term supplies of iron ore to Japan. It is thus desirable to retain the merits of fixed price and fixed quantity of the long-term contracts, and to take measures against cyclical fluctuations. Since the function of a buffer stock of stockpiling is limited in iron ore, use should be made of macroeconomic adjustment policies that mitigate international transmission of cyclical fluctuations.

On the other hand, a problem exists as to whether long-term contracts alone are sufficient to guarantee the necessary amount of iron ore supplies to Japan when a supply shortage arises or when an interruption of the ore supply occur as a result of floods or the strikes in an exporting country. One measure against such situations is Japan's equity participation in mining development and operations to make sure that the terms of contracts are observed. Although the extent of equity participation is declining in the United States, its utility is still not low in the Japanese case since most of Japan's equity participation has so far been only nominal. At the same time, there are cases in which host countries themselves ask for Japan's equity participation, rather than production sharing or plain long-term contracts.

Another measure against supply shortages or stoppages is the geographical diversification of supply sources. In the 1960s Japan had already diversified its import sources of iron ore (see table 1). But this was simply the result of efforts to import as much iron ore as possible. Conscious efforts at

diversification were made in the 1970s when the import share from Brazil was increased to make it Japan's second most important supply source after Australia.

Thus, equity participation and geographical diversification of supply sources have been promoted as *the White Paper on Resources Problems* (1971) by the Ministry of International Trade and Industry advocated.

3. The elements of economic co-operation

Traditionally economic co-operation has been considered humanitarian in purpose and to be separated from trade which is essentially based on the profit motive. A new phenomenon, increasingly noticeable in Japan, is a tendency to incorporate a variety of economic co-operation into the mineral trade. For instance, much of Japan's economic co-operation in recent years has been rendered to the petroleum exporting countries in order to secure oil imports from these countries. Although such examples of economic co-operation are as yet not frequent in the case of iron ore, the construction of pelletizing plants and port and loading facilities in the exporting countries is directly related to its mining and trade, and the construction of steel plants and the contribution to the regional development programmes are indirectly related. Most of these activities are of course not profitable in themselves. We may infer the implications of this new phenomenon.

In mining development and the iron ore trade, it is generally possible to distinguish the following four agents (see figure 1). They are the governments of the importing country (Japan) and of the exporting country, as well as the steel producers and trading companies (of Japan), and the mining companies which may be public, local private, or foreign in their origin. These four agents are identifiable in the case of other minerals by their relationship will be different.

The closest relationship is to be found in transactions between the Japanese steel producers and trading firms on one the hand, and the mining companies on the other. In fact, this will be the only relationship that exists when the transactions are carried out solely on a commercial basis. The rapid growth of the iron ore trade has been achieved by long-term contracts of this type between the two parties. A more flexible execution of the contracts in recent slump years was also decided upon by the two parties.

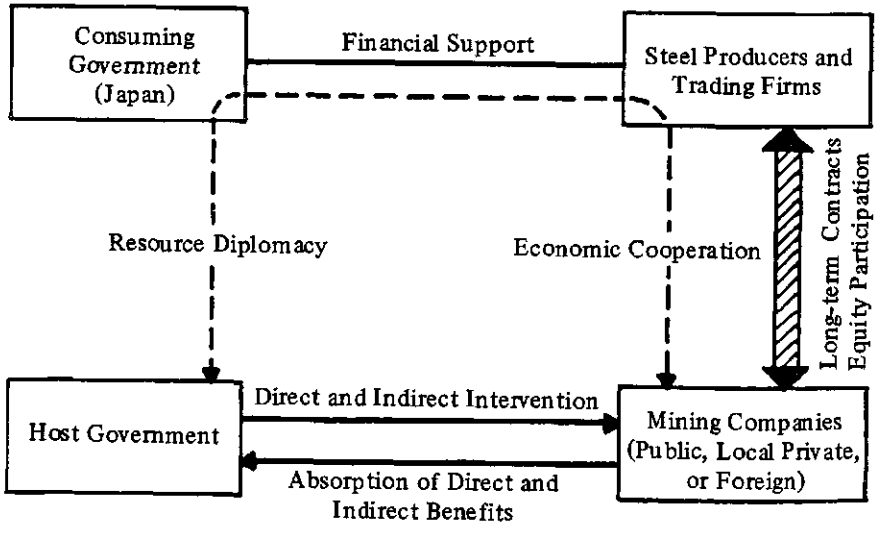
Note that there are two aspects to this relationship. Each party tries to turn the terms of trade in its country's favour over the other by making the greatest possible use of its bargaining power. At the same time, they collaborate to bring about long-term, dynamic benefits —beneficial to both parties. These two aspects seem to explain the aforementioned events —flexible execution of the long-term contracts and the increase of iron ore price in the situation of excess supply of recent years. The move by the Japanese steel producers to promote equity participation to supplement plain long-term contracts is also explained by their desire to mutually increase long-term benefits by siding with the mining companies.

One of the tendencies that became apparent in the 1970s was the increase in direct intervention by the host governments in the activities of the mining companies in the name of resource sovereignty. Chile (1971-1973), Mauritania (November 1974), Venezuela (January 1975) and Peru (July 1975) successively nationalized foreign iron-ore mining companies. In October 1975, the Association of Iron Ore Exporting Countries (AIOEC) was formed to collectively turn the terms of ore exports in their favour. In those countries where the activities of foreign mining companies are still allowed, the intervention of the host governments is also on the increase in the form of higher tax collection and through various regulations.

To cope with this tendency on the part of the host governments, the governments of the consumer countries are expected to play a more active role. Since the ore import activities of the Japanese steel producers benefit the Japanese economy as a whole, the Japanese Government has financially supported the procurement of material inputs by the steel producers. However, the active involvement of the host governments made the Japanese Government strengthen its activity in the mineral trade in two ways. Firstly, it incorporated the elements of economic co-operation in the mineral trade in support of the ore procurement activities of the steel producers. Secondly, it strived to create a better environment for the mineral trade and developmental investment by directly influencing the host governments. By so doing, interruptions to mining

Figure 1

THE RELATIONSHIP BETWEEN THE CONSUMING AND HOST COUNTRIES IN IRON ORE MINING AND TRADE



development and to the mineral trade, which so often happened in the past in the event of nationalization and other forms of intervention by the host governments can be prevented. This amounts to what is called resource diplomacy.

C. IRON ORE MINING AND DEVELOPMENT POTENTIALS

In this section, we shall examine in what ways, and what kind of benefits the host countries have achieved from iron ore mining and related activities.[61] Special attention will be given as to how Japan has been involved in the development examined in the next section on the desirable forms of Japanese economic co-operation with Latin America in iron ore mining.

1. Private versus public enterprises in iron ore mining

In 1979 Japan imported 130.3 million tons of iron ore amounting to US$ 2 999.3 million. The import of this huge amount was made possible by the expansion of existing mines and the development of new mines in the countries where iron ore is abundant. These mines can be classified into two groups: those developed and controlled by private enterprises and those by public corporations (see figures 2 and 3, respectively).

One notable example of the former group is provided by Australian iron ore mines. In Australia, the embargo on iron-ore exports had been enforced since 1938. After it was lifted in December 1960, the development of large-scale iron mines began for export purposes, and the first iron ore cargo left for Japan in 1966.[62] Japan is the most important importer of Australian iron ore and, conversely, Australia is the most important supply source of iron ore to Japan. Rich iron ore reserves are found in the Pilbara district of Western Australia where such large-scale iron mines as Mt. Goldsworthy, Hamersley, Mt. Newman, and Robe Rive have been opened for the huge Japanese market. As is clear from table 2, all these mines have been developed by private enterprises.

In Australia, the Federal and State governments are not directly involved in iron mine development and mining activities. Empowered to authorize iron ore exports, the Federal government normally confines itself to checking the terms of export contracts and collecting export taxes. The State government of Western Australia provides mining concessions to the private enterprises with the proviso that the construction of port and loading facilities, railroad, housing, etc., —as well as the pelletizing plants in the near future— be part of the mine development projects.[63] With the concession fees and other government revenues, it is making an integrated regional and industrial development programme in the Pilbara district including the construction of steel industries.[64]

In this way, in a country like Australia whose government only indirectly takes part in the development of iron ore mining and exports, the Federal and the State governments assume the burden of utilizing tax revenues collected from mining and ore export activities for the development of its economy.

Figure 2

IRON-ORE MINING BY PRIVATE ENTERPRISE

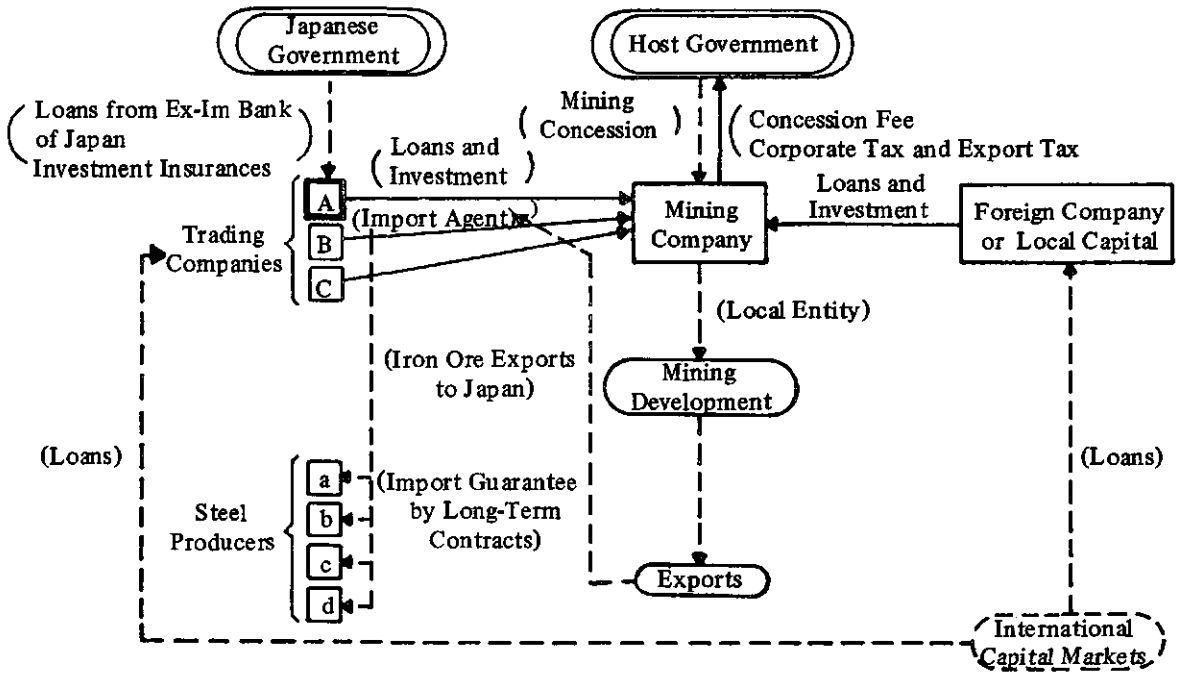
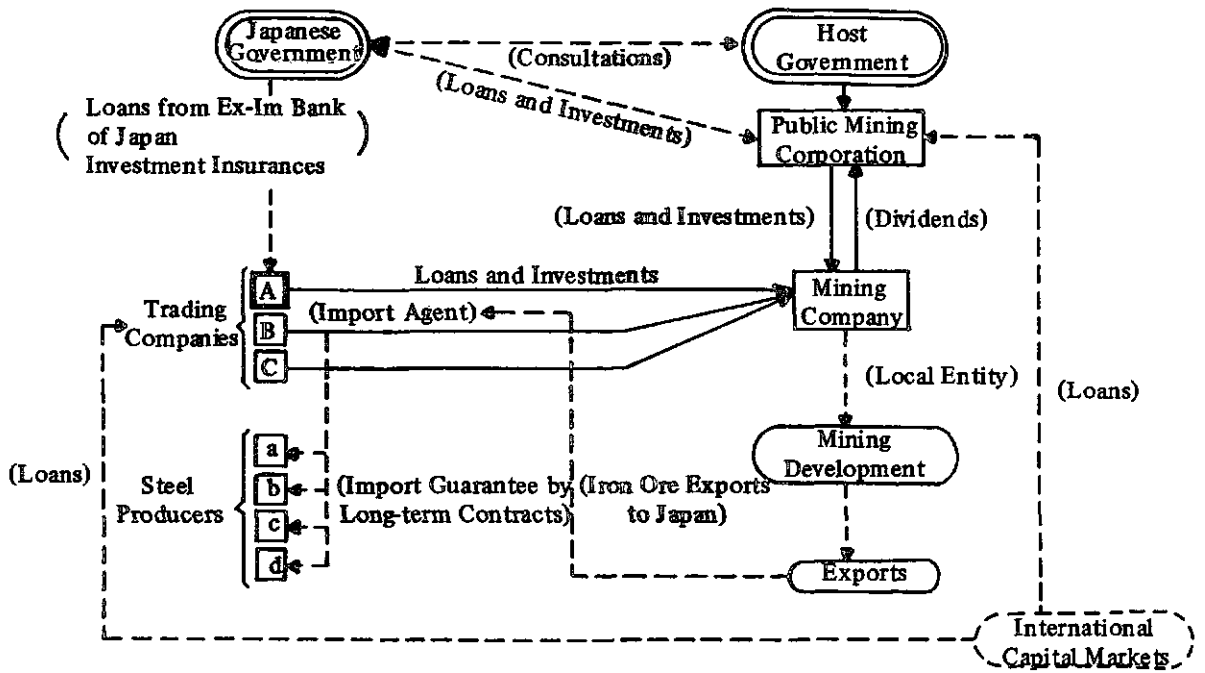


Figure 3

IRON-ORE MINING BY PUBLIC CORPORATION



Turning to the second most important supply source of iron ore for Japan, Brazil is characterized by the coexistence of the two types of iron mining enterprises mentioned above. On the one hand, such local private firms as the MBR (Mineraces Brasileiras Reunidas) and the SAMARCO have developed iron ore mines jointly with foreign enterprises.[65] On the other hand, a public corporation CVRD (Cia. Vale do Rio Doce) has been engaged in iron mine development, mining operations, ore transport and export.

To jointly develop the Capanema mine in Minas Gerais, the CVRD established Minas da Serra Geral, S.A., in September 1976 with a Japanese consortium —the equity ratio being 51% for the CVRD and the remainder for the Japanese group. The first shipment of iron ore was scheduled for October 1980.[66] One of the advantages of mining development by a public corporation is the cost reduction in foreign borrowing. Generally speaking, local private firms and joint ventures in developing countries are not well known in international capital markets. Hence they are often obliged to pay high risk premiums for the loans obtained. In the case of a public enterprise like the CVRD, however, it is possible to borrow the necessary development funds at a lower interest rate with the backing of the government, and then invest it in or finance its joint venture, thereby reducing the burden of interest payments. Since the interests are an important item in ore production costs, this represents a considerable advantage.

Furthermore, in a country whose government participates in iron ore mining, a public enterprise directly acquires the gains from mining development and more often than not invests them in related activities. Thus, the CVRD built two pelletizing plants by itself with annual production capacities of two million and three million tons each. In addition, it also built three more pelletizing plants in joint ventures with Italy (ITABRASCO with a capacity of three million tons per year), with Spain (HISPANOBRAS with a capacity of three million tons per annum), and with Japan (NIBRASCO, with six million tons in its two plants).[67] In addition the CVRD plans the development of the Carajas mines in the State of Para as the pole of the regional development of the underdeveloped area of Brazil's Northeast.[68]

Thus far, by taking mines in Australia and Brazil as respective examples, we have shown iron mine development by alternative types enterprises. Captive mines may be added as a third type. Strictly speaking, they are a variant of iron mine development by private enterprises. Typically a steel producer in an industrialized country establishes a wholly-owned subsidiary in the host country, develops a captive mine and obtains iron ore from it. Since most mines of this type were nationalized by the governments of the host countries, captive mines in the true sense of the term rarely exist today.[69]

Nationalization implies the change of ownership of an iron mine from private to the public hands. Friction often arises in the process and mine development and iron ore trade are interrupted as was the case in Chile, Mauritania, Venezuela, Peru, etc. But once the confusion in transition has died away, there is little difference from mines developed and controlled by a public enterprise.

It is interesting to note that the difference between the two types of mines —privately-owned and State-owned— has been blurred in recent years. In the

countries whose governments only indirectly take part in the development of iron ore mines, the contribution of mining activities to the development of the economy is traditionally realized through the siphoning off of government revenues from mining to other branches of the economy. But in these countries, government intervention in mining activities is getting stronger. On the other hand, in those countries whose governments are directly involved in the development of iron ore mines, the efforts to relate mining development activities to other sectors of their economy are increasingly evident.

Depending on the degree of government intervention of the host countries, their development strategies will differ. Accordingly, Japan's economic co-operation in the development of iron ore mines may take different forms. But even if the partner in the development of an iron ore mine, is the host country government, the Japanese Government cannot deal with it directly. Japanese private enterprises are always directly involved. When the partner is a State enterprise, there may be apprehension as to the continuity of its policy. But intergovernmental co-ordination is needed whether the partner is a State or private enterprise. The co-ordination is required especially in matters relating to short-term cyclical fluctuations and indirect benefits from iron ore mining.

2. Benefits from iron ore mine development

The most important benefit for the host country from iron ore mine development and ore exports is the income to be created by exploiting untapped iron ore resources. Part of the income accrues directly to the host government as government revenues. Since part or most of the ore mined is exported, the host country earns foreign exchanges (see table 5).

There are three, closely related aspects in utilizing the direct benefits mentioned above for the economic development of the host country. The first aspect is how to discover economically exploitable iron ore reserves, actually develop mines, and transport ore to its markets to create income. Many host countries do not possess the capability to find ore deposits and evaluate their

Table 5

JAPAN: BENEFITS FROM IRON ORE MINE DEVELOPMENT

Direct benefits	*Indirect benefits*
Income creation effect	Forward linkage effect
Government revenue effect	Processing of iron ore
Foreign exchange earning effect	Processing of pig iron and crude steel with the construction of integrated steel plants
	Backward linkage effect
	Regional development effect
	Employment creation effect
	Technology diffusion effect

economic feasibility for mining by themselves. They lack both sufficient capital, technology, and managerial skills to develop and operate mines and marketing abilities In developing iron ore mines and ore exports, these countries, thus, have to rely on industrialized countries in one way or another.

This leads to the second aspect, i.e., the distribution of the direct benefits between the host country and importing countries. As explained in the previous section, many iron ore-producing countries expressed their dissatisfaction in this respect and endeavoured to increase their share of the benefits by greater participation in mining activities, nationalization of international iron ore mining enterprises, and the formation of the Association of Iron Ore-Exporting Countries (AIOEC). Finally, the third aspect concerns the use of the direct benefits thus acquired for the development of the economies of iron ore-producing countries.

During the 1950s and 1960s when world demand for iron ore was growing rapidly, not much attention was paid by the host countries to the problems of creation, distribution, and utilization of the direct benefits. These are the problems which became the object of serious attention in the 1970s when the world iron ore demand stagnated and oil crises and worldwide recession adversely affected these countries' economies.

The transition to the stagnant growth period produced new problems, too. One of them was the adjustment of ore production to demand fluctuations under stagnant growth, and another the problem of using the indirect benefits from iron ore mining to further economic development, for it became increasingly apparent that the rapid expansion of direct benefits could not be expected to revive for some time. Since the first problem has already been touched upon earlier, we shall discuss the latter problem here.

In addition to the direct benefits, many iron ore-producing countries are, consequently, at present, trying to derive indirect benefits from iron-ore mine development and ore exports which are external to their economies.[70] One of the indirect benefits is the forward linkage effect (see table 5). Included in this effect are the development of local processing of iron ore into pellets and sinter as well as the manufacturing and further processing of pig iron, crude steel, steel, and steel products with the development of local steel industries.

The iron ore-producing countries, naturally prefer to export ores in processed forms. a) These countries can create higher income and acquire more foreign exchange earnings from a given amount of ore when ore selection, beneficiation, and other forms of preparation and processing are carried out before export for higher value added, rather than exporting ore as it is mined. Although ore processing is much more capital-intensive than mining operations *per se*, an increase in employment is also expected, however little it may be. b) In addition, a further forward linkage effect can be expected through iron ore processing by widening the base for industrialization of the producer countries unless mining activities are merely confined to an enclave of modern industries.

At the same time, imports of processed ore have advantages for the consumer countries, too, as compared with imports of unprocessed ore. c) The import of processed ores with high Fe content reduces transport costs. This is especially important when ores are imported by long-distance maritime transport which requires a good deal of heavy oil whose price is rapidly

increasing. d) Ore-importing countries can save energy and electricity needed for processing. This makes local processing of iron ore in a country or area which abounds in energy resources especially attractive. e) Import of processed ore prevents environmental pollution in importing countries. This advantage is especially great if ore processing is carried out in a sparsely populated area before import. By reducing real costs of ore inputs, trade in processed ore is beneficial to not only the steel producers and the importing countries, but also the mining and ore processing firms, and increases efficiency in the utilization of resources of the world as a whole.

However, for an iron ore mining enterprise, and especially for a multinational enterprise which can locate its processing plant either in the consumer country or the producer country, the following factors work against local processing before export. f) competition with the existing processing plants in the consumer countries, g) the lack of infrastructure and external economies for local processing which are readily available in the consumer countries, and h) the risk of default on the principal and interests from investment in processing equipments in the developing countries.[71]

Local processing of iron ore steadily proceeded throughout the 1960s and 1970s in the face of the presence of factors f) - h) which apparently worked in a direction that prevented local processing. Although factors f) and g) increase the opportunity costs of equipment investment for local processing, international reallocation of production facilities is possible in the long run, and factor h) can be covered by agreements on investment indemnity between the consumer and the host governments.

Exports of processed ore have been carried out exclusively in the form of pellets. They are like pin balls in size and shape with a diameter of about 9-16 mm and made from low-grade ores (Fe content 35-40%) by washing and selecting them to make high grade fine ores and then hardening with limestone by high-temperature firing. This method of preparation has been widely used by U.S. steelmakers for Canadian ore whose iron content has decreased.

Pellets have a good reducibility in blast furnaces and are easy to transport. But their price is about 70% higher than that of fine ores.[72] Iron ore pelletizing was welcomed in the developing countries. In the 1970s many large-scale pelletizing projects were promoted especially in mines in Africa with low-grade ore. In Latin America, too, pellet production capacity reached 49 million tons in 1979, of which about half was supplied by Brazil.

Considerable excess supply of pellets has been expected to emerge since the latter half of the 1970s because of the increase in pelletizing costs due to the increase in petroleum prices and the preference of the Japanese and European steel producers for cheaper sinters. Many pelletizing projects are now suspended and, of the operating pelletizing plants, some have already closed down.[73] Given the present situation, it is true that the advantages offered for the Japanese steel producers by pellet imports is not great. But the desire of iron ore, producing countries to export processed ore is strong and measures should be taken to further the merits of local processing.

1) As the grades of iron ore to be mined will deteriorate in the future, pelletizing seems to be an inevitable consequence as was seen in the

experience of U.S. steel producers. Where cheap natural gas is abundantly available, pellets can be produced at competitive prices.

2) The preparation process of iron ore is not confined to pelletizing. Sinter is made by heating fine ores in combination with limestone and it comprises 70% of iron ore used in Japanese blast furnaces. Because sinter was not suited to long distance transportation, sintering plants were normally constructed in the steel mill sites. But sintering plants are heavy pollutors, while environmental regulations are getting stricter in industrialized countries. Recently, a new technique was developed which enabled long-distance maritime transportation of sinter. Thus, in lieu of pellet exports, the promotion of sinter exports seems to be one promising direction.[74]

3) In addition to the preparation and processing of iron ore, exports of semi-manufactured pig iron and crude steel products are another direction for local processing before export. This produces higher value added than ore processing and has greater forward linkage effect by fostering the industrial base of the host country. Since the benefits for the consumer countries (c), d) and e) above) are also achieved, it is also desirable from the standpoint of rational reallocation of production locations.
The production of pig iron and crude steel requires, however, much higher technologies compared with ore processing, as well as greater fixed investment in plant and equipment. Furthermore, the obstacles f), g) and h) stated above are great, and the trade in semi-manufactured iron and steel products is still not significant. However, as many projections on the steel industries tell us, steel production of the present-day developing nations may surpass that of industrialized countries in the year 2000. Through the international readjustmet of industrial structures based on the longer-run view, competition with the existing facilities in the present-day industrialized countries must be resolved.

The steel industries of the world are increasingly market-oriented and the endowment of rich and cheap iron ore reserves is merely one favourable factor to promote the production of semi-finished products of pig iron and crude steel. In other words, integrated steel production up to the stage of finished products is strongly influenced by market factors. Among the iron ore-producing countries, therefore, some have too small an internal market and others have mines located too far from their major domestic markets to establish integrated steel plants of their own.[75] However, in those countries where iron mines are located near their major markets or their products could have important external outlets, steel industries can be the pole of the development of their economies. This is especially so in the markets of developing countries where steel intensity is still low and the material increase in steel consumption is certain to come along.

With a population of 116.1 million and US$ 1 135 of per capita income in 1977, Brazil, for instance, has a huge domestic market. Moreover, its economic activities are concentrated in the three contiguous states (São Paulo, Rio de Janeiro and Minas Gerais) and almost all its iron ore is mined in the *Quadulatero Ferrifero* area in Minas Gerais. In addition, virtually all the materials inputs necessary for steelmaking except coking coal and petroleum can be supplied

Table 6

PRODUCTION OF CRUDE STEEL IN BRAZIL AND AUSTRALIA

(Millions of tons)

	1966	1970	1977
Brazil	3.7	5.4	11.1
Australia	6.0	6.8	7.3

Source: Japan Iron and Steel Federation, *Tekkō Tōkei Yōran*, various years.

domestically. Thus, as table 6 shows, Brazil's steel production has rapidly outstripped that of Australia and is now by far the most important steel producer in Latin America with the production of 11.1 million tons of crude steel (1.7% of world total) in 1977.

Japan's economic co-operation in Brazilian steel production started in the late 1950s when the USIMINAS (Usinas Siderurgicas de Minas Gerais) was founded in Ipatinga, Minas Gerais, as a Japanese-Brazilian joint venture. This integrated coke-based steel mill now ranks thirty-ninth in the free world, producing 2.3 million tons of steel in 1976. Another integrated steel mill is under construction as a Brazilian-Japanese-Italian joint project (Cia. Siderurgica Tubarão with an annual production capacity of 3 million tons). Also noteworthy is the joint pelletizing project (Cia. Nipo-Brazileira de Pelotização-NIBRASO) which started operation in 1978.

It should be noted that all these projects use ultra-modern technology supplied from Japan. There are cases, however, in which the most advanced technology may not be the best choice for the local need. For example, the Malayawata Steel in Kedah, Malaysia, is a Japanese-Malaysian joint project started in 1965. Because Malaysia lacks coking coal, its integrated steel mill with an annual production capacity of 120 thousand tons has been designed to use charcoal made from the trunks of aged rubber trees which are abundantly available locally.[76] As is clear from the example of the Malayawata, not only Brazil but also other Latin American countries could similarly reap the indirect benefits of iron ore mining development and exports when Japan's economic co-operation efforts find their proper outlets based on technological-*cum*-institutional innovation. In Algeria, Argentina, China, Mexico, Venezuela and other iron ore-producing countries, Japanese steel makers have already been promoting technological co-operation in the construction of integrated steel plants.

The backward linkage effect is listed as the second item of the indirect benefits from iron mine development and ore exports in table 5. It has been less important to date, since the iron ore mining industry's heavy demand for equipment has largely been met by imports. While this may be expected to change somewhat, except in the case of highly sophisticated machinery, the

larger backward linkage effect may derive from the impact of construction of port and infrastructure facilities. Development and improvements of these facilities, especially in remote, underdeveloped regions, are closely related to the regional development effect.

Iron mine development favourably affects not only the mining site and its surrounding area but also the areas where railroad and port facilities are constructed. An iron ore mine is often situated in a sparsely populated, underdeveloped area and it may potentially become the pole of the integrated regional development of such a region. Recent developments of two Brazilian States, Minas Gerais and Espírito Santo, owe much to iron mine development in Minas Gerais and the development of the city of Vitoria, Espírito Santo, as the iron ore loading port. The development of Minas Gerais has been accelerated by the establishment of several integrated steel plants (USIMINAS, Belgo-Mineira, Mannesmann, Acesita, etc.) which use iron ore mined within the State. Belo Horizonte, the State capital, has grown to the third largest city in Brazil after São Paulo and Rio de Janeiro with a population of 1.56 million in 1976.[77] This clearly demonstrates amplified multiplier effects of iron mine development. Taking the remarkable development of Minas Gerais as an example, Brazil is also promoting the development of the Carajas mines in Para to make them the core of the development of the underdeveloped part of Brazil's Northeast.[78]

In Australia, too, a similar, large-scale integrated regional development project is contemplated in the Pilbara district as stated above.[79]

Thanks to iron ore mining and exports, several cities have sprung up on the Pacific Coast of South America, though they are rather small in size. In Chile, cities such as Coquimbo, Copiapó and Caldera have developed around the Coquimbo and Atacama mines in the past twenty years. In Peru, the city of San Juan has developed a population of 20 000 inhabitants as the loading port for iron ore from the Marcona mine.

In the Pilbara district of Australia or in Chile or Peru in South America, large integrated steel plants are as yet to be constructed because of the limit placed by their small domestic market and regional development based on iron ore mining has been centred on mining and loading activities. However, by the introduction of the processing of iron ore into fines, pellets, slurry, etc., its multiplier effects have been enhanced.

Finally, employment creation and technology diffusion effects may be listed as the indirect benefits from iron ore mining. Iron mine development itself is capital intensive and its employment creation is generally small. But once the jobs indirectly generated through the linkages and regional development effects are taken into consideration, it will no longer be small.

It should also be noticed that the employment creation effect of iron ore mining activities itself can be significant depending on natural as well as socioeconomic conditions. For example, both Mt. Newman iron mine in Australia and Itabira mine in Brazil are the largest iron ore mines in the world, each producing 30 million tons or so of high-grade ores annually. Both are open-cast mines and adopt the most advanced mining equipment and technologies in their operation: huge power shovels are used to mine ores, dump trucks with 170 tons of loading capacity bring them to the crushing plants, and after computer-controlled ore selection and loading processes, they are transported by a cargo

train. Both are located in remote areas and mining towns were constructed in mining sites in the middle of the 1960s with the development of iron ore mining activities. But note that the population of Mt. Newman is 3 500, while that of Itabira is 60 000. This contrast in the number of inhabitants between the two mining towns is impressive because both mines have a similar scale and use much the same technologies and production facilities.

This difference is partly explained by the difference in the natural conditions of the two areas. Mt. Newman is located in the midst of the Pilbara Desert and the mining company has invested in the construction of workers' residence, schools, supermarkets and all other facilities of the town. On the other hand, though isolated, Itabira is situated in green valleys with ample supply of natural waters. The mining company has offered no more than a few housing facilities and the rest is left to the natural development by the inhabitants.

Socio-economic conditions also differ greatly between the two regions. Almost all the people in Mt. Newman are company employees. Most of them are single male workers newly arrived from southern Europe and live an autonomous lifestyle. On the other hand, the town of Itabira includes not only 4 500 company employees but also people engaged in retailing and other services. Each worker has a large family and those in the high income bracket have domestic employees in their household. In the two cases discussed, the mines are of much the same scale and use similarly capital-intensive production facilities, but illustrate the impossibility of categorically stating that the employment creation effect in iron ore mining is small.[80]

As is clear from the fact that most of the iron ore mined is to be exported, the iron ore mining industry —in addition to favourable locational factors— must operate efficiently with the use of modern technology so as to be an internationally competitive export industry. So long as mining activities are confined to iron ore mining and closely related sectors of the economy and form an enclave, the technology diffusion effect is limited. On the other hand, when iron ore mining, railroad, and port facilities form a core and high technology and high efficiency spill over to other industries, the technology diffusion effect can also be great.

To sum up the benefits the host countries derived in the past from iron ore mining and exports were centred on the direct benefits, and the indirect benefits were not significant. In the 1980s, however, iron ore-producing countries will promote iron ore mining and exports in such a way that they enhance the indirect benefits discussed above. This will be the case whether iron ore mining development is carried out by a private enterprise or by the governments' active participation. In a country such as Brazil in which socio-economic conditions are favourable, it is possible to promote its economic developemnt by utilizing the direct and indirect benefits from iron ore mining as the leverage. In other countries, too, it is possible to make use of indirect benefits to their economic development as was the case of the Malayawata Steel in Malaysia.

In this section, we have also discussed, albeit fragmentally, the role that Japan has played to amplify the indirect benefits. We shall not consider the various possibilities of Japan's economic co-operation in iron ore mining in the final section.

D. IRON MINE DEVELOPMENT, IRON ORE TRADE AND ECONOMIC CO-OPERATION

For the importing countries, economic co-operation in the minerals trade means assisting the exporting countries in their efforts to enhance the benefits of resource development and trade. The greater the benefits, the stronger the motive of these countries to maintain harmonious relations in the minerals trade with the importing countries. This, in turn, will contribute to the secure access to minerals supply on the import side.

Economic co-operation in iron ore mining will take a diversity of forms at the stages of mining development, production, loading, overland and maritime transportation and sales, as well as in the realization of the indirect benefits. Trade almost by definition brings benefits to both the importing and exporting countries. Even if economic co-operation does not directly lead to the reduction in iron ore production costs, it will provide the importing country with an incentive for co-operation provided that it is conducive to the stable import of iron ore. On the other hand, even if it is beneficial to the importing country generally, there are cases in which it is not likely to provide incentives for economic co-operation in private mining ventures because of the presence of large external economies. The case in point is that of the indirect benefits discussed in the previous section.

The benefit of stable ore imports accrues directly to the steelmakers, and the divergence in the interests between the importing country as a whole and the steel producers will not arise in so far as economic co-operation in iron ore mining is concerned. In fact a prosperous iron ore trade may bring additional external economies to the steel producers by promoting trade in iron and steel products in the opposite direction.

Depending on the circumstances, the form of economic co-operation, and especially the manner in which the governments of both the importing and the exporting countries are involved will differ. When the benefits are obvious for the steel producers and mining enterprises, iron mine development and iron ore trade will be carried out at the private level, and there will be no need for the governmental propulsion. However, should external effects be significant for the iron ore-producing country, the host government is most likely to actively intervene in mining and related activities. This is especially so in those countries where the private enterprises are engaged in mining activities and the host governments indirectly control them. On the other hand, in the case of the importing country —Japan— since the steel producers and trading companies are very important private business groups, they are left to carry out economic co-operation in iron ore mining on their own initiative so long as it contributes to the stable procurement of iron ore. But the greater the extent of economic co-operation needed and the stronger the aspects of external effects in the host country, the greater the impact of the external effects on the importing country. In such a case, the support of the government of the importing country seems to be required.

In the previous section, we examined various benefits for the host country from iron mine development and iron ore trade. By referring to them, the

desirable forms of Japan's economic co-operation in iron ore mining may be considered stage by stage:

1) As the existing mines are exploited, promising iron ore reserves must be prospected and new mines developed. In many underdeveloped regions of the world, basic geological surveys have not yet been conducted. Iron ore is likely to be abundant in developing countries, and it is of benefit to the world as a whole to find out these iron ore reserves and to develop iron mines.
   Developing countries do not have sufficient technology to conduct basic geological surveys. Only advanced countries possess this capacity. If it is to be used, however, sufficient understanding between the governments is required, in view of the upsurge of resource nationalism. General basic geological research essentially belongs to the realm of economic co-operation to be promoted on an intergovernmental basis for it does not directly relate to the profit motive.
   In Japan, the institutional arrangement in this area is well established. Japanese firms which conduct an exploratory study into overseas mineral resource development (general survey) and a feasibility study (specific survey) receive subsidies (one half to two-thirds of the necessary funds) and low interest loans (less than one half of the required capital, repayable over ten to twenty years with 3.5%-6.5% interest rate) from the Metal Ore Exploration Promotion Agency (for developed countries) and the Overseas Economic Co-operation Fund (for developing countries). The promotion of pertinent geological research projects is awaited.[81]

2) The development of new iron mines and the expansion of existing mines require considerable capital and technology. In Latin America as a whole, fixed investments in iron ore mining and steel industries amounted to US$ 2 600 million in 1977. Of this amount, 14% was financed by the enterprises own funds, 53% from other internal sources, while the remaining 33% was supplied externally. But the third figure represents only the direct inflow of foreign capital. If the indirect inflow of foreign capital through financial intermediaries and public mining development corporations of various countries in the region is added, the share of foreign capital would reach to 80-90%.
   Part of the necessary funds are, thus, obtained on the international financial markets. At the same time, Japanese steelmakers and trading companies are often asked to invest in or finance the projects since they are major purchasers of iron ore. Although the steel producers and trading companies are the private entities directly involved, the Japanese Government closely backs them up through government finance. It is usually the case that the Japan Export Import Bank in co-operation with the private financial institutions gives loans to iron ore imports and iron mine development investment (normally the Japan Export Import Bank offering 70% and the city banks the remaining 30% with interest rates of 6-9% and repayments over 5 to 10 years).
   The public development corporations in developing countries frequently have sufficient technology for developing and operating iron ore mines.

The technological level of the CVRD of Brazil, for instance, is one of the highest in the world. When developing countries need technical assistance, multinational mining companies are often called upon on a contractual basis. The scope of Japan's contribution in this respect is small since its experience in large-scale iron mine development is still limited. With regard to overseas sales of iron ore, the CVRD is an experienced marketer. Public export corporations of developing countries which were established along with the public mining corporations are often efficient and competitive internationally. Japanese trading companies, are virtually unable to sell iron ore in areas other than Japan. As was the case when the Marcona iron mine in Peru was nationalized in 1975, the host country may face financial difficulties as well as difficulties in iron ore sales in the aftermath of the takeover of a foreign mining enterprise. Nationalization is indeed one of the strategies that the host countries adopt in the upsurge of resource nationalism. However, situations that may cause the suspension of iron mine development or the interruption of iron ore exports must be avoided. In this area, the role that the intergovernmental resource diplomacy such as investment guarantee agreements could play is great.

3) Long-term contracts represent the current mainstream practice in the iron ore trade. However, it is necessary for them to incorporate supplementary measures to tide over short and medium-term demand fluctuations. A more flexible execution of the terms of long-term contracts reflects the interests of the importing country. The prevalence of this convention is likely to increase the dissatisfaction of the exporting countries and may endanger the long-term stability of the iron ore supply itself. Instead, the merit of fixed quantity and fixed price in the terms of contracts should basically be retained and, at the same time, measures be taken to protect the interests of both the importing and exporting countries against short and medium-term demand fluctuations. Since the function of a buffer stock or export income compensation scheme has its limitations in the case of iron ore, intergovernemntal macroeconomic policy adjustments are needed to deal with the problem of the transmission of business fluctuations from the iron ore importing to exporting countries.

4) The scope for economic co-operation is great at the stage of overland transportation, loading and maritime transportation of iron ore. In pursuit of economies of scale, new iron mine development has been concentrated on large-scale mines and the development of small and medium-scale mines has been neglected. These mines, however, include those which would become sufficiently competitive with large-scale mines because of their closer location to the markets, better ore quality and so forth once such bottlenecks as port and loading facilities are resolved. In India, the Philippines and Malaysia, there are quite a few mines whose ore exports can be increased when overland transportation, port and other facilities are improved. Judged only from the standpoint of scale economies, the potential of these small and medium-scale mines should not be overlooked.

As for the medium-scale mines in Chile and Peru on the Pacific coast of South America, overland transportation, loading and port facilities have been well established, and serious bottlenecks do not seem to exist in this respect.

In addition, it is necessary to continue the efforts for technological-*cum*-institutional innovation in marine transportation of iron ore. In the 1960s specialized carriers and ore/oil carriers enabled Japan to import iron ore from distant sources. Innovations of this kind should be introduced: the second Panama Canal Plan and the "Asian Port" scheme are epoch-making projects in this area.[82]

5) Regional development based on iron mine development is the field in which economic co-operation of the iron ore importing countries is most anxiously anticipated. Iron ore mining is a large-scale enterprise and requires the construction of a railroad system and port facilities for the transport of iron ore. Moreover, it has significant indirect effects in that it induces ore processing, steelmaking and processing of steel products. It is, thus, often placed at the centre of a broad regional development programme as was the case in the Pilbara district of Western Australia or the Carajas mines in Brazil. The developmental effects of such a regional development programme are not confined to iron mine development and the iron ore trade, and a wide range of economic co-operation between the importing and the host countries is necessary. For this reason, in the Japanese case, it is frequently promoted as a national project based on an agreement between the Japanese Government and the government of the host country. Major Japanese enterprises of all the related industries and major Japanese trading firms participate in the project with the full backing of the Japanese Government through financial and investment guarantees. The institutional framework of this practice is well established in Japan and is sometimes called the "Asahan scheme".[83]

6) The possibility of iron ore exports in processed forms was discussed in detail in the previous section. At present, world market conditions are unfavourable to pelletizing. However, it is not easy for those countries which cannot have integrated steel plants due to the small size of their domestic market and other limitations to give up this form of processing. The competitiveness of local processing before export must be strengthened by the development of alternative ore processing techniques and in combination with the entry of resource development. There is another field in which technological development is wanted. There are mines which are neglected as environmental regulations become stricter because their ores contain impurities such as sulphur and phosphorus. This is in fact the principal reason why iron ore exports from Chile and Peru are lagging behind. The technological innovation in local sinter production and its long distance maritime transport will be a promising form of processed ore exports.

7) The construction of integrated steel plants is the direction that the iron ore-producing countries are most anxious to follow. The steel industry is regarded as the foundation of modern industries, and the Japanese steel

producers are asked for assistance by many countries in the construction and operation of steel plants. The Malayawata Steel and the USIMINAS discussed in the last section are prominent successful cases. Technological co-operation in steelmaking is in progress in Algeria, Argentina, China, Mexico, Venezuela and other countries. It is underscored that, because of deferred payments on the exports of steelmaking equipment and the low interest-rate loans and grants to the construction of steel mills and technical assistance, this is a profitable transaction for the Japanese steel producers in charge of technological co-operation. Competition with existing steel mills in industrialized countries may cause problems. However, as many future projections indicate, the expansion of steel production capacity in developing countries is an inevitable course. Rather than curbing the trend, the readjustment of industrial structures must be actively promoted. The role of governments in providing orientation and establishing a favourable environment is far from negligible.

Finally, before concluding the present paper, the relationship between the private sector and the Government in Japan's economic co-operation in iron ore mining must be discussed. As was analysed in section C, Japanese iron ore import strategies were formulated and carried out by the steel producers and the trading companies in the private sector: the major steel producers formed the Overseas Steelmaking Materials Committee and jointly developed new supply sources of iron ore with the aid of the trading companies and concluded long-term ore purchase contracts. Since these enterprises are important business groups in the private sector, the Japanese Government refrained from direct involvement in their efforts to acquire iron ore from abroad and indirectly supported their activities through government finance.

Ever since the overall supply constraint on natural resources was recognized in Japan around 1970, various measures for secure access to resource supplies have been advocated in the *the White Papers on International Trade* and other government publications. The *White Paper on Resource Problems* published in 1971, for example, pointed out the need for such measures as the promotion of Japan's equity participation in resource development, the diversification of import sources, the introduction of stockpiling and so forth. These measures were mainly meant for petroleum and non-ferrous metals, and iron ore and coking coal seemed still to be left to the private sector.

It must be noticed, however, that government finance has played a very important role when a group of Japanese steel producers and trading firms participated in iron mine development or concluded iron ore import contracts. In addition to the foreign investment finance and mineral import finance supplied by the Overseas Economic Co-operation Fund and the Japan Export Import Bank stated above, the Ministry of International Trade and Industry has offered the foreign investment insurance scheme and the Reserve Fund for the Losses from Natural Resource Development Investment. The former scheme was established in 1970. Its use is actually not confined to resource development and it has given important support to foreign investment by private enterprises in general. On the other hand, the latter system, established in 1971, allows a firm to set up a reserve fund (100% for its investment for exploration and 30%

for exploitation) based on the special tax measure act. The resource trade policies expressed in the *White Papers on International Trade*, etc., are understood to indicate the direction of the flow of government finance. Even if iron mine development has been promoted in the hands of the private business groups, nevertheless, the role that the government has played in Japan's iron ore imports is significant.

A new element in mineral trade policy which appeared in the recent *White Papers on International Trade* is the promotion of economic co-operation to resource-rich countries. Although this seems to be principally directed at petroleum and non-ferrous minerals, it is also applicable to iron ore for the reasons already stated above. However it does not merely mean the increase of financial support from the Japanese Government for private sector activities in investment in iron mine development and the iron ore trade. Even expenditure on economic co-operation must be efficiently spent subject to budgetary constraints. Excessive financial support may cause overdependence on the part of the private sector. The pursuit of efficiency by the private sector through the price mechanism should be at the centre of iron mining development, and the role of the government should be confined to the improvement of the climate for investment and trade.

With regard to the possible fields of economic co-operation in iron ore mining discussed above, those closely related to the direct benefits of specific mining enterprises and specific steel makers should be left to the private sector. The governments of both the importing and host countries should concentrate on activities which have major external economic effects. In other words, high priority should be placed on those activities which benefit all the mining enterprises and steel producers equally (i.e., basic geological surveys, technology development, shipping, investment guarantee agreements, etc.) and those which enhance the indirect benefits in the host country (i.e., the construction of steel plants, the assistance to regional development, etc.).

The unifying theme of this project is technological-*cum*-institutional innovations and its focal point is to explore the measures to accelerate the economic development of Latin American countries by modifying, where necessary, their development mechanisms with Japan's economic co-operation. As examined here in the case of iron ore, the incorporation of the elements of economic co-operation into mineral development and trade will have the effect of promoting the development of resource-rich countries. The possible areas of co-operation were indicated in 1) - 7) of the present section and the relationship between the government and the private sector in Japan's economic co-operation was probed in the concluding part of this section.

Chapter 4

NEW AGRICULTURAL DEVELOPMENT IN LATIN AMERICA AND JAPAN'S CO-OPERATION

Latin America is a region where land is abundant in relation to population and is expected to have the largest development potential of new agricultural land for food production compared with other regions of the world. In contrast, Japan is a small country and is one of the largest importers of food and feed grains of the world. So far, Japan has depended heavily on the United States for imports of foods and feeds, but is trying to diversify its suppliers, particularly among Latin American countries.

Consequently, the economic relationship between Latin American countries and Japan will become closer if more agricultural products can be exported from the former to the latter. This chapter aims at examining the possibilities of expanding agricultural production and exports of Latin American countries to meet the increasing demand for several products of which Japan imports large quantities from the world market. In this connection, this chapter will also explore the possibilities for effective technical co-operation between Latin America and Japan not only in the field of production of export crops, but also overall development of Latin American agriculture. For this purpose, this paper examines the following three points.

1) There is considerable potential for increasing agricultural production and exports not only by expanding cultivated land area, but also by increasing yield per hectare using modern technology in some of the Latin American countries. If appropriate policies are adapted in relation to Latin America's comparative advantages on the world market, Latin America can increase its agricultural output significantly since land is used extensively and some large farms still employ traditional production technology.

2) Since the demand for some export crops in the exporting countries will increase with the increase in per capita income, conditions of demand and supply of such crops in exporting countries have to be carefully examined.

3) Since land is distributed unequally among farms in many Latin American countries, the polarization of land holding between large and small farms will become more serious if appropriate policies are not taken for small

farmers. This is not only applicable to the small countries, but also to the large exporting countries, since the latter also have the same problems in some of their regions.

Considering the above three points, this chapter will reveal the problems to be solved and find possible areas of economic and technical co-operation between Latin American countries and Japan to contribute to solving them.

A. DEMAND AND SUPPLY CONDITIONS OF CEREALS AND SOYA BEAN IN LATIN AMERICA AND JAPAN

1. Changes in demand for food in Latin America

Though many Latin American countries export cereals, their deficits averaged 2 million metric tons during the 1972-1974 period if countries of the region are taken as a whole. During the 1975-1977 period, both production and consumption in this region were around 83 million tons, and the production just met consumption. However, net imports of cereals in 1975 and 1976 were around 3.5 million tons and 10 million tons respectively, and exports exceeded the imports by 0.43 million tons only in 1977.

Among cereals, demand for wheat and rice as food is growing, while that for maize and sorghum has decreased in recent years. However, demand for maize and sorghum as feeds is increasing, because of increases in demand for eggs, poultry meat and pork. Demand for soya beans is also increasing, mainly because of the increase in demand for edible oil. In Brazil, production of soya beans has increased enormously. However, the export of soya bean grain has not undergone a parallel increase because of the increase in domestic demand for edible oils. Since the beginning of the 1970s, soya bean production in Brazil has increased at the expense of maize production because soya bean competes with maize in land use. In 1971, the export of maize amounted to 1.28 million tons, but it decreased to 172 thousand tons in 1972 and to 41 thousand tons in 1973, and the government temporarily banned maize exports in that year. In contrast, exports of soya beans have increased from 213 thousand tons to around 1.8 million tons during the same period.[84]

In Mexico, production of maize exceeded consumption during the 1961-1965 period. This continued until 1972 except in 1970.[85] Since 1973, Mexico has become a maize-importing country which imported nearly 1.7 million tons of maize in 1974. In the case of wheat, circumstances are quite different. Until 1966, the country imported wheat, but succeeded in increasing production and became an exporting country during the 1967-1970 period. Since 1971, it has become an importing country again, though an increase in production has continued. This can be shown by the fact that annual wheat consumption per capita increased from around 34 kg in the 1961-1965 period to 55 kg in 1974. On the other hand, annual maize consumption per capita as food decreased from 126 kg to 109 kg during the same period. But maize consumption as feed increased due to the increases in consumption of pork and poultry meat.

According to the survey made by Fondo de Cultura Económico of the Banco de México,[86] the income elasticity of demand for maize as food is negative both in rural and urban area, while that for wheat is positive and higher particularly in rural area on the basis of cross-section data. The income elasticities of demands for pork and poultry were 0.59 and 0.76 in urban areas respectively, while those in rural areas were 0.76 and 0.90 respectively. Total increase in demand for livestock products and feeds in the future is likely to be very high. Without a study analysing a change in the food consumption pattern in relation to that of income (income elasticity of demand for foods), the availability of cereals for export will not be known in Latin American countries.

2. Projection of supply and demand for food and feed grains

a) *Projection for Japan*

According to the projection of supply and demand for foods prepared by the Japanese Government in 1975,[87] imports of coarse grains and soya beans in 1985 are shown in table 1.

The projection was based on 1972 demand and supply conditions. On the demand side, population growth rate, growth of per capita income and income elasticity of demand for each commodity have been considered. On the production side, it is assumed that the self-sufficiency rates of wheat, coarse grains and soya beans will increase. Since production still exceeds consumption in the case of rice, it is assumed that the acreage alloted to reduce rice production will continue until 1985.

The import requirements shown in the above table were estimated on the basis of demand and supply projections by commodity. In the case of wheat, production will increase by 5.3% per annum, while demand will increase 0.7% per annum. The per capita demand for it will decrease since the population growth rate was estimated as 1.1% per annum. Self-sufficiency in wheat in 1972 was 5% and that in 1985 is estimated as 9%.

In the case of feed grains the demand for livestock products was estimated first. The demand for milk and milk products was projected to increase by 2.8% per annum (from 51.8 kg per capita per annum in 1972 to 65.2 kg in 1985)

Table 1

IMPORTS OF SELECTED CEREALS AND SOYA BEANS

(Thousands of tons)

	1972 (actual)	1985 (projected)
Wheat	5 088	5 346
Maize and sorghum	10 367	16 114
Soya beans (grain)	3 369	4 580

Source: Long-term Projection of Food, Ministry of Agriculture and Forestry, 1975.

during the 1972-1985 period, while the supply including imports was projected to increase by 3.4% per annum. The demand for meat including poultry was projected to increase from 14.2 kg per capita per annum in 1972 to 18.6 kg in 1985 or by a total 3.1% per annum, while production was projected to increase by 3.6% per annum during the same period. Imports of meat except beef were estimated to decrease, but beef imports were projected to increase from 77 thousand tons in 1972 to 117 thousand tons in 1985.

Based on this projection of demand and supply of livestock products, the demands for concentrated feeds were estimated as in table 2. As shown, the import requirement in terms of T.D.N. (Total Digestible Nutrients) in 1985 was estimated as 14.8 millions tons. Import requirements for foodstuffs in terms of actual volume was estimated at around 16 million tons of maize, sorghum and some other feed grains. Soya beans are consumed in Japan for two purposes: processed foods and oil extraction. The demand for soya beans for processed foods was 621 thousand tons in 1972, while that in 1985 was projected to increase to 707 thousand tons. If the demand for soya beans for oil extraction was included, demand in 1985 was estimated as 5 million tons. Soya bean production was expected to increase from 127 thousand tons in 1972 to 427 thousand tons in 1985. Import requirements for soya beans were estimated as 4.6 million tons in 1985.

Since the projection reflects the Japanese Government's desire to raise the level of self-sufficiency in food supply including foodstuffs, it is based on an assumption which includes high growth rates of food and feed grains. For this reason, present imports are expected to increase more than the figures indicated.

Table 2

DEMANDS FOR CONCENTRATED FEEDS (IN TERMS OF T.D.N.)

(Thousands of tons)

	Total	Domestic product	Import
1972	15 516	5 628	9 888
1985	20 609	5 839	14 772

Source: Long-term Projection of Food, Ministry of Agriculture and Forestry, 1975.

b) ***Projection of demand and supply of food in Latin America and the World.***

FAO made projections of several agricultural commodities, commodity by commodity, in 1978.[88] It has made two sets of projections: basic and supplementary. The former projection is mainly based on past trends, e.g., past growth rates, development plans, demand conditions, etc., were assumed to prevail. In the latter projection, the trends referred above were assumed to

Table 3

PROJECTED ANNUAL GROWTH RATE OF PRODUCTION AND DEMAND OF COARSE GRAINS (1972-1974 TO 1985)

(Percentages)

	Production		Demand			Supply		
	Basic	Supply	Total	Feed	Food	Total	Feed	Food
Latin America	2.9	4.2	3.7	4.5	2.8	4.2	5.3	2.6
Argentina	1.9	3.6	2.5	2.7	1.7	2.8	3.1	1.1
Brazil	3.6	4.8	4.5	5.4	2.3	5.2	6.3	2.3
Mexico	3.3	4.3	3.2	3.9	3.2	3.4	4.9	2.7

Source: Estimated by IDCJ members based on FAO, "Commodity Projections for 1985", 1978.

exceed past trends. As mentioned above, both projections were made commodity by commodity, but it should be noted that the assumptions were not always the same for each commodity.

According to the projection, world production of coarse grains was projected to increase from an average of 654 million tons in 1972-1974 to 838 million tons in the case of the basic assumption and 870 million tons in the case of the supplementary assumption in 1985. Production in Latin America was projected to increase from 49 million tons to 53 million tons during the same period. The growth rates of Latin America's production were projected for basic and supplementary assumptions as 2.9% and 4.2% per annum respectively, which are higher than the world average and the average for other developing regions. The growth rates are particularly high for Brazil and Mexico as shown in table 3.

The projection also shows the increase in demand for coarse grains and the high demand for coarse grains in Latin American countries is shown in table 3. The table reveals that the growth rate of demand for coarse grains as foodstuffs is quite high, while that of coarse grains as food is almost the same or slightly less than the population growth rate. The growth rate of coarse grains as foodstuffs is particularly high in Brazil and Mexico. The reason for this is a rapid increase in demand for poultry meat and pork in these countries, for which a large amount of coarse grains has been consumed, as explained in the foregoing paragraph.

Table 4 shows the net trade balance of coarse grains in Latin America and some countries in the region as examples. As shown in the table and in previous tables, in spite of a high rate of increase in production, Latin America as a whole and most of the countries in the region will become net importing countries with the exception of Argentina, according to the basic assumption projected by FAO. Even in the case of the supplementary assumption, exports almost all come from Argentina.

In Latin America, the volume of imports of agricultural products as a whole exceeded that of exports in the past. FAO index numbers of volume of

imports and exports are shown in table 5. The table reveals that the annual growth rate (compound) of volume of exports is 2.2%, while that of imports is 4.5%.

The facts shown above indicate that increased agricultural production both for domestic consumption and for export is of great importance not only for the development of agriculture but also for the economic development of Latin America.

Table 4

PROJECTED BALANCE OF COARSE GRAINS IN 1985

	Production		Demand		Net balance	
	Basic	Supply	Basic	Supply	Basic	Supply
Latin America	**68 980**	**80 730**	**70 870**	**74 930**	**-1 890**	**+5 800**
Argentina	18 480	22 550	10 810	11 260	7 670	11 290
Brazil	24 040	27 720	25 780	27 760	-1 740	-40
Mexico	17 220	19 420	18 690	19 070	-1 470	350

Source: Estimated by IDCJ members based on FAO, "Commodity Projections for 1985", 1978.

Table 5

LATIN AMERICA: INDEX NUMBERS OF VOLUME OF AGRICULTURAL IMPORTS AND EXPORTS

(1961-1965 = 100)

	Exports	Imports
1961-1965	100	100
1966	110	110
1967	109	113
1968	111	122
1969	117	124
1970	121	127
1971	115	134
1972	120	141
1973	125	160
1974	117	189
1975	122	168
1976	134	182
1977	144	201
Annual average	2.2	4.9

Source: Food and Agriculture Organization, *Trade Yearbook, 1976* and *1977*, Rome, 1977 and 1978.

B. STRUCTURAL CHANGES IN AGRICULTURE IN LATIN AMERICA

1. Disparity of per capita income between the agricultural and non-agricultural sectors

Among the 23 Latin American countries presented in table 6, there is a wide range of difference of per capita GDP by region and by country. Such countries as Venezuela, Argentina, Uruguay and Chile are those whose per capita GDP is higher than US$ 1 000 while Haiti, Bolivia and Honduras are those whose per capita GDP is less than US$ 500. Generally, per capita GDP is higher in countries which are situated along the Atlantic coast.

In the Latin American countries in the above table, the gross agricultural product per person engaged in agriculture is 21.2% of that in non-agriculture during the period 1975-1977. However, if countries such as Argentina and Uruguay are taken as an example, the discrepancy mentioned above disappears. In Argentina, for instance, the ratio of gross product per person engaged in agriculture to that in non-agriculture was 117 on average during the same period. In contrast, in Brazil and Mexico, the ratios were 12.7 and 15.6, respectively. It has been also found that the gross product per person engaged in agriculture in Argentina and Uruguay were US$ 3 920 and 3 860 respectively, while those in Brazil and Mexico were US $ 648 and 825 respectively on average during the period 1975-1977. This shows that the gross product per person engaged in agriculture in the former was almost five to six times higher than that in the latter.

Such higher labour productivity in Argentina and Uruguay is attributed to the larger agricultural land area per person engaged in agriculture than in Brazil and Mexico. The agricultural land areas were 127 and 108 hectares in the former two countries, and 13.8 and 13.5 hectares in the latter two countries respectively during the period mentioned above. In contrast, the land productivity (gross agricultural product per agricultural land area including pasture land area) in Argentina and Uruguay were US$ 30.9 and 35.7 per hectare respectively and these figures were the lowest along Latin American countries (see table 7). In Brazil and Mexico, however, land productivity was higher than in Argentina and Uruguay, but with levels of US $ 46.9 and 61.0 respectively, it was not as high as that in other Latin American countries.

It should be noticed that the production mentioned above represents average figures by country, but they differ by size of holdings. As will be seen in the next section, the irregularity of land distribution among farmers is one of the characteristics of agriculture in Latin America. As shown in table 8, uneven distribution of land holding is one of the major factors behind the uneven distribution of income. It is also found that a country such as Argentina, which has less difference of per capita output between the agricultural and non-agricultural sectors has relatively even distribution of output, by size of holding. But those, like Mexico and Brazil, which have large difference between the two have more uneven distribution of output.

Table 6

GROSS DOMESTIC PRODUCT PER CAPITA, PERCENTAGES OF GROSS AGRICULTURAL PRODUCT (GAT) TO GDP, PERCENTAGE OF PERSONS ENGAGED IN AGRICULTURE TO TOTAL ACTIVE POPULATION AND DISCREPANCY OF AGRICULTURAL AND NON-AGRICULTURAL INCOME

	GDP/pop. (US$)	GAP/GDP (%)	Agri. pop./ E.A. pop. (%)	Percentage of GAP/ person (gross non-agri. P./ person = 100)	GAP/ person (US$)	Agri. land. area incl. pasture land/ person (ha)
Argentina	1 693	12.6	14.2	87.0	3 920	126.7
Barbados	1 580	13.5	18.0	71.1	2 883	2.1
Bolivia	478	16.2	52.1	17.8	447	38.1
Brazil	1 071	8.2	41.2	12.7	648	13.8
Chile	1 236	9.8	20.5	42.1	1 874	25.7
Colombia	598	24.3	31.1	71.2	1 508	9.7
Costa Rica	1 015	20.2	37.9	41.5	1 689	8.3
Dominican Republic	829	18.3	58.2	16.1	900	3.0
Ecuador	589	22.1	47.0	32.0	821	6.7
El Salvador	579	23.7	52.7	27.9	838	1.9
Guatemala	852	27.3	57.3	28.0	1 410	2.6
Guyana	572	16.2	24.2	60.5	1 210	22.6
Haiti	187	44.2	69.8	34.3	236	0.9
Honduras	489	29.9	64.2	23.8	755	5.3
Jamaica	1 285	7.6	24.0	26.1	1 231	2.9
Mexico	998	9.3	39.6	15.6	825	13.5
Nicaragua	845	22.6	46.2	34.0	1 286	14.8
Panama	1 289	16.1	37.3	32.3	1 547	7.4
Paraguay	495	33.9	50.3	50.7	1 051	36.8
Peru	911	13.0	40.3	22.2	1 006	16.4
Trinidad and Tobago	1 308	4.6	16.9	23.7	1 079	2.7
Uruguay	1 315	15.0	13.1	117.1	3 862	108.1
Venezuela	1 984	6.1	20.8	24.7	1 927	28.5
Average	1 049	11.2	37.3	21.2	982	

Source: Calculated from Yearbook of Inter-American Development Bank and FAO, 1977.

Table 7

LAND PRODUCTIVITY AND RATIO OF ARABLE LAND

	Arable land (US$) (1)	Total agri. land (US$) (2)	Ratio of arable land (percentage) (3)
Argentina	157.9	30.9	19.6
Barbados	1 572.7	142.7	89.2
Bolivia	107.0	11.7	11.0
Brazil	252.6	46.9	18.6
Chile	220.2	73.0	33.2
Colombia	680.9	155.7	22.9
Costa Rica	854.7	204.5	23.9
Dominican Republic	736.5	297.3	40.4
Ecuador	175.4	122.5	69.8
El Salvador	866.5	432.9	50.0
Guatemala	808.6	534.4	66.1
Guyana	193.7	153.3	37.9
Haiti	442.3	274.9	62.1
Honduras	466.3	143.6	55.2
Mexico	207.3	61.0	29.4
Nicaragua	282.1	86.8	30.8
Panama	636.6	208.6	32.9
Paraguay	445.6	28.6	10.9
Peru	562.0	61.5	12.3
Trinidad and Tobago	426.1	398.2	93.5
Uruguay	289.9	35.7	12.3
Venezuela	281.0	67.6	31.7
Latin America	259.3	55.1	21.2

Source: FAO. *Production Yearbook*, 1977

Note: (1) $\frac{\text{Gross Agricultural Product (GAP)}}{\text{Arable land + Land under permanent crops}}$

(2) $\frac{\text{GAP}}{\text{Arable + Permanent crop + Pasture land}}$

(3) $\frac{\text{Arable land + Land under permanent crop}}{\text{Arable + Permanent + Pasture land}}$

2. Unequal distribution of agricultural land

The uneven distribution of agricultural land among farmers is one of the most serious issues in Latin American agriculture. It has a long historical background and the polarization of the farming class is still going on in some countries. This has caused not only uneven distribution of income in agriculture, but also in the entire economy of a country, since many countries in Latin America still have

Table 8

DISTRIBUTION OF NUMBER AND GROSS AGRICULTURAL PRODUCT BY KIND OF FARM

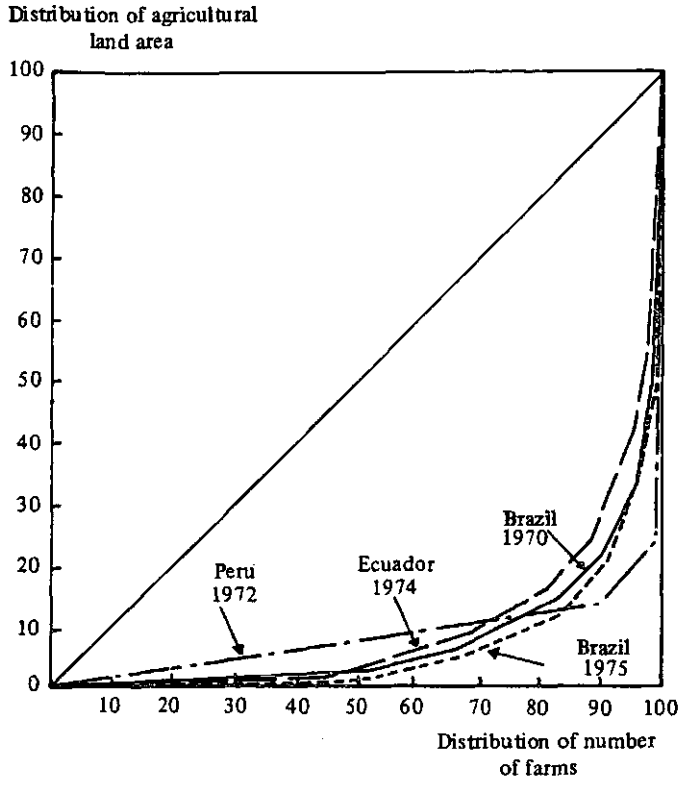
(Percentages)

Kind of farm / Country	Sub-family		Family		Multi-family medium		Multi-family large		Total	
	Number	Gross agricultural product	Number	Gross agricultural product	Number	Gross agricultural product	Number	Gross agricultural product	Number	Gross agricultural product
Argentina (1) (1960)	43	12	49	47	7	26	1	15	100	100
Brazil (1) (1950)	22	3	39	18	34	43	5	36	100	100
Colombia (1) (1960)	64	21	30	45	5	19	1	15	100	100
Chile (1) (1955)	37	4	40	16	16	23	7	57	100	100
Ecuador (1) (1954)	89	25	8	33	2	22	1	19	100	100
Guatemala (1) (1950)	88	30	10	13	2	36	0	21	100	100
Peru (1) (?)	88	...	9	...	2	...	1	...	100	...
Mexico (1) (1960)	84	21	13	24	3	22	0	32	100	100
Mexico (2) (1970)	58	12	40	49	1	9	1	30	100	100

Source: (1) S.L. Barraclough and A.L. Domike, "Agrarian Structure in Seven Latin American Countries", *Land Economics*, November 1966, pp. 395 - 402, base on CIDA Studies.
(2) Estimated by IDCJ, based on *V Censos Agrícola-Ganadero y Ejido, 1970* and *V Censo Ejidal, 1970 Resumen Especial Vol. 1*, Secretaría de Industria y Comercio, Mexico, September 1976.

Figure 1

DISTRIBUTION OF AGRICULTURAL LAND IN SELECTED LATIN AMERICAN COUNTRIES



Source: Various issues of Censuses of Agriculture in Peru, Ecuador and Brazil.

large proportions of their population engaged in agriculture (see figure 1). Consequently, most of the countries in Latin America have agrarian reform programmes which are given the highest priority among agricultural policies. So far, however, the results of agrarian reform programmes have not been very impressive, because they are in many cases hampered by social and political factors.

In Brazil in 1970, according to the 1970 Census of Agriculture, 51.4% of the total number of farms of less than 10 hectares held only 3.1% of the total agricultural land areas, while only 0.03% of farms of more than 10 thousand hectares held 12.3% (see table 9). In 1975, according to recent data[89] the former group of farms (less than 10 hectares) represented 52.3% of total farms and held only 2.7% of the total agricultural land area, while the latter (more than 10 thousand hectares) represented 0.04% of total farms and held 14.4% of the total agricultural land area. In particular, the number of farms of more than 100

Table 9

DISTRIBUTION OF FARMS AND LAND BY SIZE OF HOLDING (BRAZIL)

	1970				1975			
	Number of farms		Agricultural land area		Number of farms		Agricultural land area	
	Number	Distribution (%)	Area (ha)	Distribution (%)	Number	Distribution (%)	Area (ha)	Distribution (%)
Less than 10 ha	(2 519 630)	(51.4)	(9 083 495)	(3.1)	(2 616 575)	(52.3)	(9 000 618)	(2.7)
Less than 1 ha	396 846	8.1	236 093	0.1	463 641	9.3	285 730	0.1
1 - 2 ha	488 562	10.0	657 544	0.2	538 503	10.7	739 503	0.2
2 - 5 ha	914 835	18.6	3 003 495	1.0	924 635	18.5	3 021 583	0.9
5 - 10 ha	719 387	14.7	5 186 364	1.8	689 796	13.8	4 953 802	1.5
10 - 100 ha	(1 934 392)	(39.4)	(60 069 704)	(20.4)	(1 893 511)	(37.9)	(60 105 695)	(18.7)
10 - 20 ha	768 448	15.6	10 742 832	3.7	732 636	14.6	10 238 374	3.2
20 - 50 ha	824 090	16.8	25 424 849	8.6	811 409	16.2	25 127 769	7.8
50 - 100 ha	341 854	7.0	23 902 023	8.1	353 471	7.1	24 739 552	7.7
100 - 1 100 ha	(414 746)	(8.5)	(108 742 676)	(37.0)	(445 970)	(8.9)	(115 907 267)	(35.9)
100 - 200 ha	215 329	4.4	29 700 402	10.1	236 721	4.7	31 830 182	9.9
200 - 500 ha	151 514	3.1	45 958 057	15.7	156 739	3.1	47 825 209	14.8
500 - 1 000 ha	47 903	1.0	33 084 216	11.2	52 510	1.1	36 251 876	11.2
1 000 - 10 000 ha	(35 425)	(0.7)	(80 059 162)	(27.2)	(40 078)	(0.8)	(91 261 090)	(28.3)
1 000 - 2 000 ha	21 492	0.4	29 270 712	9.9	24 314	0.5	33 206 913	10.3
2 000 - 5 000 ha	11 372	0.2	33 463 379	11.4	12 743	0.2	37 549 158	11.6
5 000 - 10 000 ha	2 561	0.05	17 305 071	5.9	3 021	0.1	20 505 019	6.4
10 000 and more than 10 000 ha	(1 449)	(0.03)	(36 190 429)	(12.3)	(1 824)	(0.04)	(46 346 330)	(14.4)
10 000 - 100 000 ha	1 416	0.03	29 142 708	9.9	1 778	0.04	36 032 169	11.2
100 000 ha and more	33	0.00	7 047 721	2.4	46	0.00	10 314 161	3.2
Not declared	18 337	-	-	-	5 211	-	-	-
Total A	4 924 019	-	-	-	5 007 169	-	-	-
B	4 905 642	100.0	294 145 466	100.0	5 001 958	100.00	322 621 000	100.0

Source: IBGE, "Simpose Preliminar do Censo Agropecuario", *Brasil, Censos Económicos de 1975, Vol. 14*, 1978.

thousand hectares increased from 33 to 46 during the 1970-1975 period and the total land area held by them increased from 7 million hectares to 10.3 million hectares. In addition the number of farms of less than 10 hectares increased from around 2.5 million to 2.6 million and the agricultural land area held by them decreased from around 9.1 million to 9 million hectares. In other words, the total agricultural land area (9 million hectares) held by small farms (2.6 million farms) was less than the total agricultural land (10.3 million hectares) held by only 46 large farms in 1975.

As mentioned in the previous 1978 paper ("Towards New Forms of Economic Co-operation of Japan With Latin America"), Brazil has various development projects in Cerrado, Amazon and some other areas where special policies such as "Polo Centro" have been taken in favour of large mechanized farms. The number of farms which increased during the 1970-1975 period were mainly those of one thousand to 10 thousand hectares and more than 10 thousand hectares respectively. Those of less than 10 hectares increased slightly, while those of 10 to 100 hectares decreased.

Similar situations are also observed in Mexico, in the Central and Andean countries and in the countries of the River Plate region. Although these countries are small, there is a marked difference of agricultural structure between coastal and hilly areas of the countries (see figure 2).

For instance, in Ecuador, there are three regions: Sierra or the mountain range; Costa or the coast area; and Oriente or the eastern part of the country. According to the 1974 Census of Agriculture[90] in Ecuador as a whole, there were around 639 thousand farms with 7.7 million hectares of agricultural land. Of those farms, around 45% were smaller than 2 hectares and occupied only 2.8% of the country's total agricultural land. The small farmers who held less than one hectare numbered 173 thousand or 27.1% of total farms, while 12 thousand farms accounted for 1.9% of total farms and held around 3.3 million hectares or 43% of the country's agricultural land area, averaging 270 hectares per farm.

In Sierra which is a hilly area and has a cool climate, there are 388 thousand small farms which account for 61% of the total farms in this country. Of these farms 54.1% own less than 2 hectares and 132 thousand small farms or 34.1% of the total cover only 1.7% of the total agricultural land area averaging only 0.4 hectare per farm. On the other hand, 5 504 large farms or only 1.4% of the total hold 43.1% of the total agricultural land area averaging 240 hectares per farm.

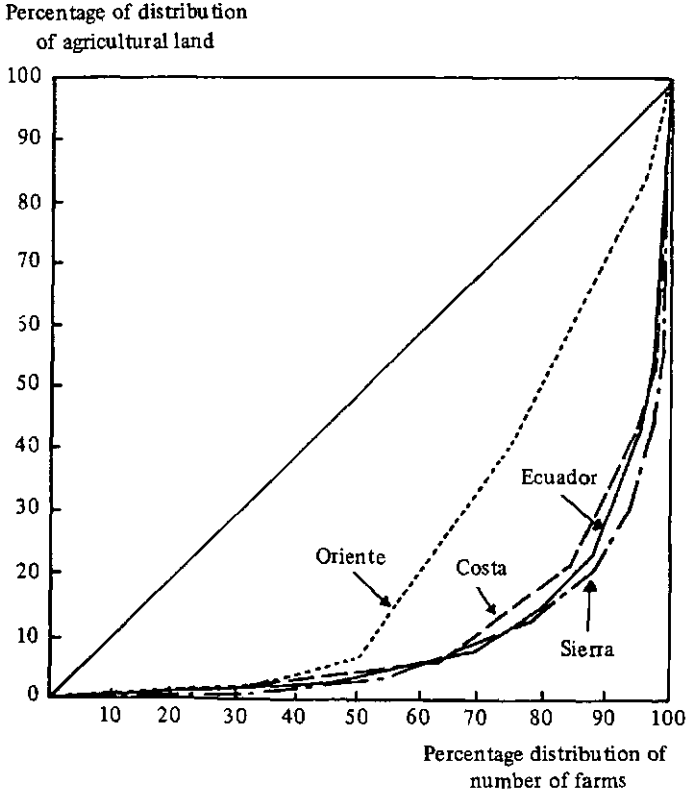
Costa is the typical tropical area of the country. The climate is hot and humid and suitable for growing tropical crops such as bananas, sugar cane, cocoa, coffee and rice. There are 227 thousand farms or about 36% of the total in Costa. In this area, 33% of the total farms which own less than 2 hectares hold 1.7% of total agricultural land, while only 2.8% of the farms which own more than 100 hectares hold 48% of the total agricultural land area, averaging 320 hectares per farm. There is another area called Oriente, the eastern part of the country where the population density is the lowest, which has only 24 thousand with 745 thousand hectares. The area is lowland and partly covered with tropical forest and the climate is hot and humid. The number of smallholders is lower than in other areas, and only 9.8% of the total farms cover less than 2 hectares. Around 57% of the total are between 20 and 100 hectares and 872 farms, of more than

100 hectares or only 3.6% of the total, cover 110 thousand hectares or around 15% of the total agricultural land area, averaging around 127 hectares per farm.

According to the survey made by Centro Universtario de Occidental of the University of San Carlos of Guatemala,[91] the number of small farms (microfincas) who own less than 0.7 hectares and that of larger farms (multifamiliares) who own more than 45 hectares increased in Altiplano Occidental (Western Plateau) between 1964 and 1974 (see figure 3). However, the farms whose size is between the two strata mentioned above decreased during the same period.

Figure 2

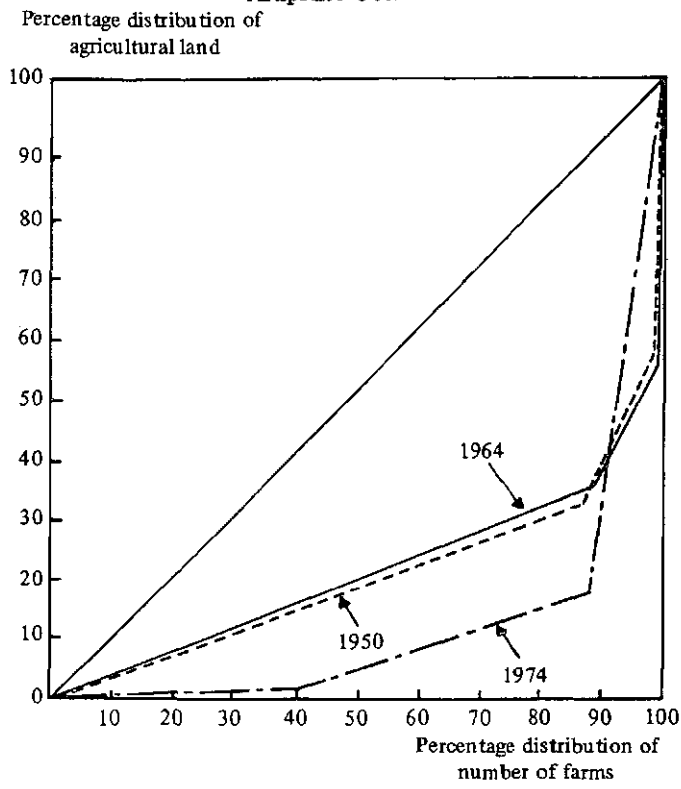
DISTRIBUTION OF AGRICULTURAL LAND BY REGION IN ECUADOR IN 1974



Source: 1974 Census of Agriculture, Ecuador.

Figure 3a

DISTRIBUTION OF AGRICULTURAL LAND IN GUATEMALA BY REGION IN 1950, 1964 AND 1974



Source: "Diagnóstico del Sector Agrícola, 1950-1977" (Mimeo). Secretaría General de Consejo de Planificación Económica, República de Guatemala C.A., 1978.

In 1950, 86.9% of the farms were smaller than 7 hectares and owned 32.5% of the region's total agricultural land area, while only 1.2% of farms of more than 45 hectares held 44.7% of the total agricultural land area. In 1975, the percentage of the number of small farms fell to 40.6% and their area declined to 1.6% of total agricultural land area, while the percentages for large farms rose to 12.4% and 82.2% respectively. This change was partly due to a policy which established large-scale farms (fincas multi-familiares) taken by FYDEP (Empresa Nacional de Fomento y Desarrollo Económico del Peten).

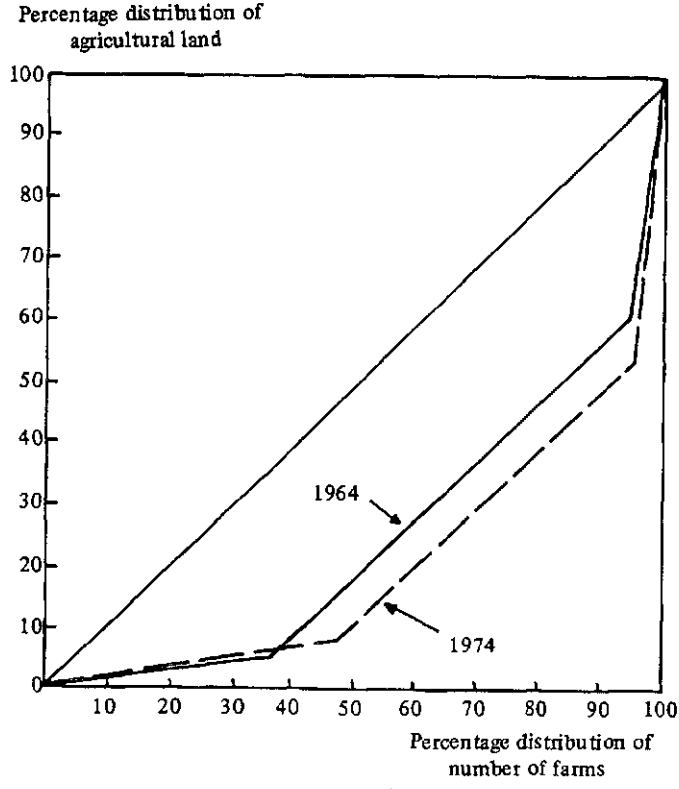
As can be seen from the foregoing paragraphs, the polarization of farmers has occurred in many Latin American countries in recent years. Economists in CIAT described that one of the factors which widened the income differentiation between rural-urban areas was "dualistic agricultural policies providing selective

subsidies to large farmers and facilitating the mechanization of formerly labour-intensive activities in which small farmers had comparative advantage".[92] This factor might have widened the differentiation of land holding between small and large farms throughout Latin American countries. This is particularly true in Brazil, and even in small countries such as Ecuador and Guatemala.

Figure 3b

DISTRIBUTION OF AGRICULTURAL LAND IN GUATEMALA BY REGION IN 1950, 1964 AND 1974

Altiplano Occidental



Source: "Diagnóstico del Sector Agrícola, 1950-1977" (Mimeo). Secretaría General de Consejo de Planificación Económica, República de Guatemala C.A., 1978.

C. TECHNOLOGY AND INSTITUTIONAL PROBLEMS

1. Low growth rate of subsistence production

Agricultural production in Latin American countries increased by 2.9% per annum during the 1961-1971 period. Food production attained the highest growth rate (3.6%) followed by export crops. But the subsistence crops which are consumed directly by producers or sold mainly in the local markets have shown the lowest growth rate per annum (2.5%). The production growth rate of such crops has been lower than the population growth rate (2.8%) of Latin America as a whole (see table 10). The subsistence crops include maize (except in Argentina and Uruguay), rice (except in Colombia), potatoes, sweet potatoes, cassava and pulses. However, the growth rate of subsistence crops is quite different from one country to another. It was lower than the population growth rate in Bolivia, Brazil, Haiti, Honduras, Mexico, Panama, Paraguay and Venezuela. Argentina shows the same trend but is a grain exporting country.

The lower growth rate of production in relation to population would create a rise in price or an increase in imports.[93] The annual growth rate of the agricultural import index in volume (4.9%) was higher than that of the export index (2.2%) during the period 1961-1965 and 1977 (see table 5). As for price, the consumer price of cassava flour in Brazil increased and the export price of beans also increased during the same period. The rises in prices, however, do not always benefit the producers, since most of the producers are subsistence farmers and even if they have marketable surpluses, the market system is traditional and their bargaining power in the market system is weak. Such phenomena indicate the importance of improving the sector which produces subsistence crops. If the productivity of subsistence crops is raised, the supply of foods in domestic market will be increased and also the standard of living of small farmers will be raised.

2. Technology in small and large farms

Modern mechanized technology for crops such as wheat, maize and soya bean is mainly suitable for large farms in countries such as the United States, Canada and Australia where the limiting factor of agricultural development had been labour. This is quite different from Asia where the limiting factor has been land particularly in the countries such as Japan and Taiwan. The scarcity of land has become more serious since World War II in other countries in Asia. This is the reason why biological and chemical technology rather than mechanical technology was introduced in Japan and Taiwan at an early date and then disseminated to other countries later.

Latin America belongs to the new world; however, it differs much from other new continents. As mentioned earlier, the dual structure of the economy or the uneven distribution of agricultural land between small and large farms still persists. There are extremely large farms where cattle are raised in the traditional way using pasture land extensively on the one hand, and small farms who grow subsistence crops in the traditional way on the other. Moreover, the

Table 10

INDEX NUMBERS AND GROWTH RATES FOR FOOD AND AGRICULTURAL PRODUCTION IN LATIN AMERICA, 1961-1977: BASED ON 1961-1965 = 100

	Agricultural production				Food production				Susbsistance production				Export production				Population growth rate (percentage)
	1966-1970	1971-1975	1977	Growth rate	1966-1970	1971-1975	1977	Growth rate	1966-1970	1971-1975	1977	Growth rate	1966-1970	1971-1975	1977	Growth rate	
Caribbean	98	116	117	1.1	100	118	121	1.4	109	121	142	2.5	86	94	90	-0.7	2.1
Barbados	...	...	...		...	...	...		...	...	...		...	...	...		0.4
Dominican Republic	102	135	140	2.4	103	137	145	2.7	126	147	169	3.8	96	111	106	4.2	3.0
Guyana	99	99	132	2.0	99	99	132	2.0	88	87	153	3.1	105	100	100	-	2.0
Haiti	92	102	97	-0.2	99	110	103	0.2	108	117	107	0.5	84	91	91	-0.7	1.7
Jamaica	94	86	81	-1.5	93	86	82	-1.4	96	100	124	1.5	89	63	56	-4.1	1.5
Trinidad and Tobago	98	89	90	-0.7	98	89	91	-0.7	82	133	147	2.8	94	92	87	-0.9	1.3
Mexico	118	140	158	3.3	124	151	173	4.0	122	121	129	1.8	104	114	120	1.3	3.5
Central America	118	144	162	3.5	127	153	171	3.9	125	141	154	3.1	116	142	152	3.0	2.9
Costa Rica	127	162	172	3.9	127	173	187	4.6	103	145	163	3.6	37	173	168	3.8	2.8
El Salvador	108	133	142	2.5	123	151	172	3.9	156	188	181	4.3	100	122	121	1.4	3.5
Guatemala	127	152	177	4.2	125	167	199	5.0	120	138	156	3.2	107	144	162	3.5	2.8
Honduras	124	135	153	3.1	125	130	138	2.3	115	111	130	1.9	131	141	154	3.1	2.2
Nicaragua	115	142	170	3.9	125	148	171	3.9	149	167	169	3.8	105	125	168	3.8	2.9
Panama	136	144	158	3.3	137	147	160	3.4	116	117	134	2.1	138	154	146	2.7	3.1
South America	116	127	150	2.9	136	135	161	3.5	117	129	143	2.6	103	128	165	3.6	2.6
Venezuela	130	154	179	4.2	132	157	187	4.6	114	109	135	2.2	117	116	121	1.4	3.1
Bolivia	110	134	145	2.7	107	126	139	2.4	108	132	132	2.0	155	776	621	13.9	2.5
Chile	120	117	144	2.6	121	120	147	2.8	92	110	137	2.2	209	211	402	10.5	1.8
Colombia	115	135	153	3.1	116	143	160	3.4	112	135	179	4.2	117	121	138	2.3	2.7
Ecuador	119	122	128	1.8	116	121	127	1.7	122	147	151	2.9	118	105	118	1.2	2.9
Peru	100	103	102	0.1	107	114	116	1.1	119	124	126	1.7	85	84	78	-1.7	3.0
Andean	113	125	124	1.5	114	130	144	2.6	112	129	147	2.8	111	111	129	1.8	2.6
Brazil	114	139	167	3.7	123	151	190	4.7	119	132	143	2.6	99	139	182	4.4	2.8
Argentina	111	114	134	2.1	113	119	137	2.3	121	109	112	0.8	86	134	207	5.3	1.5
Paraguay	108	123	190	4.7	108	117	167	3.7	107	104	136	2.2	117	284	700	14.9	3.5
Uruguay	96	94	94	-0.4	96	103	102	0.1	117	138	158	3.3	100	148	397	10.3	0.7
River Plate	109	112	132	2.0	111	118	135	2.2	116	110	125	1.6	187	141	234	6.3	1.6
Latin America	114	130	151	2.9	132	138	163	3.6	118	128	141	2.5	104	126	153	3.1	2.8

Source: 1966-1970 data based on Economic Research Service, *Agriculture in the Americas: Statistical Data*, FDCD Working Paper, U.S. Department of Agriculture, Washington, D.C., 1976, pp. 1-8. 1971-1977 data based on Economics, Statistics and Cooperatives Service, "Indexes of Agricultural Production for the Western Hemisphere, 1968-1977", U.S. Department of Agriculture, Washington, D.C., 1978. Quoted from John H. Sanders, *et al.*, "Technology Production and Small Farmers" (mimeo), CIAT, June 1979, p.27.

Note: Subsistence production is defined in terms of the following crops: maize (except in Argentina and Uruguay), rice (except in Colombia), potatoes, sweet potatoes, cassava and pulses.

latter are far more numerous than the former, and the agricultural land area occupied by the latter is only a small part of the total. However expansion of the farmland occupied by small farms is rather difficult, mainly for social and political reasons. The new technology based on machinery was introduced into large farms in recent years. This was mainly induced by government policies to strengthen the competitive position of the export crops of the newly developed land in the world markets. Such technology has mainly been introduced from the United States, including new seeds, large farm machinery, etc.

New high-yielding varieties of rice, maize and wheat developed by the international agricultural research institutes such as IRRI and CIMMYT were also introduced into Latin American countries, but these varieties of crops have not been of much benefit to small farms. In Mexico where CIMMYT is situated, for instance, the percentage of dissemination of new high-yielding varieties of maize in 1972 was only less than 10%, while that for wheat was as high as 90% in the same year.[94] The reason for this is that hybrid corn varieties are rather suitable for large mechanized farms since seeds have to be purchased every year and small farms cannot afford to purchase them. On the contrary, wheat is mainly grown by large farmers whose land is mostly irrigated. The yield per hectare of wheat has become higher since the introduction of new high-yielding varieties. Also the extension services in Latin America are given a higher priority on larger farmers than smaller farmers. Moreover, large farms can employ technicians at their own costs or hire them jointly among large farms.

3. Strategies for technological improvement

There are several international agricultural research institutes in Latin America. CIMMYT in Mexico has already been mentioned in the previous section. Others are CIAT (International Center for Tropical Agriculture) in Colombia, IAIAS (Inter-American Institute for Agricultural Sciences) and CATIE (Centro Agronómico Tropical de Investigación y Enseñanza) in Costa Rica. In these institutes, a new strategy for agricultural research has been adopted[95] and it is quite a different strategy from that adopted in other older research institutes such as IRRI and CIMMYT. The new strategy is to place more emphasis on "on-farm experiments" rather than controlled experiments on a single crop in an experiment field in the research institute. And the emphasis is also laid only on small farmers. To make on-farm experiments or studies effective, the technicians are assisted by sociologists and economists. Their assistance includes evaluation of the technology applied to farmers' fields and investigation of the economic and social constraints of technology. If constraints are found, the technicians in the field station are informed as well as those in the central research station.

This methodology for evaluating the technology is not only used for single crop cultivation but also for crop rotations and/or cropping patterns, and greater emphasis is laid on the latter. The new technology to be developed is a simple one which uses less inputs to increasing yields. In addition the crops selected for technical improvement are subsistence crops such as cassava, pulses and pasture land improvement in the case of CIAT. Sociologists and economists

study the effectiveness of technology transfer to small farmers at the farm level, while economists analyse input and output relations, decision-making by farmers, marketing of products, etc.

Similar strategies are applied in agricultural research stations in the individual countries in the region. For instance, in Guatemala, controlled research into single crops represents one third of the total research and the remaining two thirds of the work is made up of field research into the problems of small farmers. Such research seem to be of interest to small farmers. If the yields of subsistence crops increase, the small farmers who had grown one or two subsistence crops, mainly for their own consumption, will be able to grow other crops including cash crops using part of their land. It means an intensification of farming which leads to a rise in small farmers' income.

Apart from the strategies for technological improvement, there are various policies for institutional improvement. The first and most important institutional problem in this region is uneven distribution of land. In many countries in Latin America, this problem is taken up by a "colonization programme" which involves transferring small farms from areas occupied by a large number of small farmers to the newly-opened areas. It is, however, difficult to find government-owned land areas on a large scale except in the case of unfertile land or land in remote areas which costs a large amount of money to open up. The government has no intention of dividing farms which are well utilized and reallocating them to small farmers, particularly if these farms produce export crops, because this would mean a decrease in export earnings. But it is politically difficult to divide large farms which are not well utilized. In addition, many countries have the problem of squatters (land holders without titles). In this case, such holders can obtain full ownership, if the landowner and the government agencies concerned reach an agreement.

The second problem is the so-called "commercialization" or marketing. It involves various problems, including producer's and consumer's prices, trade margins, wholesale markets, transportation and storage. The third problem is credit. Since it is closely related to the problem of purchasing modern inputs, it is also related to the technological problems.

Various approaches are adopted to these problems. Modern inputs which are effective to raise crop yields are distributed to small farmers through institutional credits with low interest rates and extension workers show how to use such inputs to improve farming. Also, the crops which are produced by small farmers are sold jointly to the wholesale market, so that farmers can exercise greater bargaining power. Such a form of integration would be successful if farmers organizations or co-operatives were strong. The government frequently encourages small farmers' to organize in such a way.

Since there are various social and economic constraints in many Latin American countries, the present situation leaves much to be desired, particularly with regard to marketing. However, in this case, greater attention should be devoted to sociological conditions in the countries, such as the existence of a rural community, which influence the establishment of farmers' organizations.

The phenomena concerned with agricultural structure, technology and economy have been discussed in the foregoing paragraphs. In the following section, the same problems will be analysed in greater detail.

D. PRODUCTION EXPANSION AND CHANGES IN YIELDS

A brief glance at Latin America's agriculture shows three distinct features of past development. One is the fact that South America's agriculture had developed using land extensively as described in the previous sections of this chapter. In the agricultural sector as a whole in South America, the area under cultivation expanded 8.8 million hectares (2.5% a year) in the first five years and 6.3 million hectares (1.6% a year) in the second five years of the 1960s. In contrast, the growth of yield had been very low. The pattern of development can be clarified by comparison with the agricultural development patterns of other continents as indicated in table 11.

Growth rates of crop acreage in Europe and North-and-Central America were -0.2% and -0.8% a year, while their growth rates of yield were 3.1% and 3.0% a year, respectively. In South America, growth rates of crop acreage and yield were 2.6% and 1.0%, respectively. From these figures, the pattern of South American agricultural development can be characterized as land-extensive development using large motorized machinery.

The second feature of the development is that the share of medium-sized farms has increased, while the shares of small and large farms have declined. Based on the available data, farm sizes, their shares and their changes over time have been calculated for Mexico, Chile and São Paulo, Brazil as shown in table 12.[96] Because of the small number of observations, we cannot draw a strong affirmative conclusion; however, we can observe a similar trend in the changing shares of different sized farm groups in the three examples. The above changes in shares over time can be partly attributed to the fact that yields of most food crops per unit of land are the highest in the medium-sized farm group. In Chile,

Table 11

AREA AND YIELD OF CEREAL PRODUCTION

Continent	1948-1952	1967-1972	Growth rates
Europe			
Area (1 000 ha)	74 783	72 240	-0.2
Yield (kg/ha)	1 503	2 704	3.1
North and Central America			
Area (1 000 ha)	108 684	93 283	-0.8
Yield (kg/ha)	1 558	2 765	3.0
South America			
Area (1 000 ha)	20 365	33 472	2.6
Yield (kg/ha)	1 218	1 467	1.0

Source: FAO, *Production Yearbook*, various issues.

Table 12

FARM SIZES AND THEIR DISTRIBUTION IN MEXICO AND CHILE

Mexico

(Thousands of farms)

	0-5ha	5-25ha	25-50ha	50-100ha	100-500ha	500-1 000ha	1 000ha -	Total
1940	928.5	152.6	46.5	31.8	40.1	6.1	9.7	1 218.9
	(76.2)	(12.8)	(3.8)	(2.6)	(3.3)	(0.5)	(0.8)	(100.0)
1950	1 000.8	191.3	59.5	43.3	48.7	7.4	10.5	1 365.5
	(73.6)	(14.0)	(4.4)	(3.2)	(3.6)	(0.5)	(0.8)	(100.0)

Source: (1) The United Nations, *Progresos en Materia de Reforma Agraria*, ST/ECA/21, 1954, p. 45.
(2) Dirección General de Estadística de México, *Estados Unidos Mexicanos Tercer Censo Agrícola Ganadero 1950*, 1954.
Note: Figures in parentheses indicate shares in percentage.

Chile

(Farms)

	0-5ha	5-20ha	20-100ha	100-500ha	500ha -	Total
1935	87.790	41 400	32 300	12 300	5 000	178 790
	(49.1)	(23.2)	(18.1)	(6.9)	(2.8)	(100.0)
1955	67 366	53 649	50 899	23 845	10 151	205 910
	(32.7)	(26.1)	(24.7)	(11.6)	(4.9)	(100.0)
1964	123 636	63 047	44 145	16 171	6 493	253 492
	(48.8)	(24.9)	(17.4)	(6.4)	(2.6)	(100.0)

Source: (1) Dirección General de Estadística de Chile, *Agricultura 1935/1936 Censo*, Santiago, 1938.
(2) The United Nations, *Progresos en Materia de Reforma Agraria Nacional*, ST/ECA/21, 1954, p.49.
(3) Dirección de Estadística y Censos, *IV Censo Nacional Agropecuario*, 1964/1965, pp.2-3.
Note: Figures in parentheses indicate shares in percentage.

São Paulo, Brazil

(Farms)

	0-9ha	10-99ha	100-999ha	1 000-2 999ha	3 000ha -	Total
1954	96 012	149 927	34 125	2 432	584	283 080
	(33.9)	(53.0)	(12.0)	(0.9)	(0.2)	(100.0)
1957	109 728	154 916	35 668	2 400	573	303 285
	(36.2)	(51.0)	(11.8)	(0.8)	(0.2)	(100.0)
1967	94 712	161 602	36 910	2 267	447	295 968
	(32.0)	(54.5)	(12.5)	(0.8)	(0.2)	(100.0)

Source: Governo do Estado de São Paulo Secretaria da Agricultura, Instituto de Economía Agrícola, *Modernization of Agriculture in the State of São Paulo*, São Paulo, 1973, p. 101.
Note: Figures in parentheses indicate shares in percentage.

for instance, farms in the 200-500 hectare group attained the highest yields in wheat, barley and oats production.[97] Also the available data for El Salvador show that yields of wheat, barley and rice were the highest in the medium-sized farm group.[98]

The third feature is that in large countries, growth rates of subsistence food production were significantly lower than those of other agricultural produce as shown in table 10 of this chapter. Since the data for Brazil is more readily available, we can investigate similar aspects from a different angle. The Institute de Economía Agrícola, São Paulo, Brazil classifies major crops into several technological groups in the *Modernization of Agriculture in the State of São Paulo* as follows.[99]

> Classification by degree of technological development was based on subjective knowledge of the situation of each product. A product is classified as being in the modern group when producers have adopted modern techniques of production and have attempted to respond quickly to market stimuli. For products included in the transition group either a more efficient technology has already been developed but its application has been limited, or the existing technology is not yet totally adequate. Finally, products in the traditional group are those that have not yet benefited from newly developed technology, or if such technology exists, it has been applied on a very small scale. Analysing the degree of technological development of the 16 products that have been traditionally cultivated in São Paulo, we can classify them in the following way:
>
> a) Modern group —cotton, oranges, potatoes, soya beans, sugar cane.
>
> b) Group in transition —coffee, corn, peanuts, manioc onions, bananas, tea.
>
> c) Traditional group —beans, rice, castor beans.

Between 1961-1965 and 1974-1976, crop yields with respect to technological groups varied substantially as shown on table 13. Yields of those products which fall into the modern group grew rapidly. Among those products included in the modern group, tomatoes which has a limited importance attained the highest growth rate in yields. Following tomatoes are soya bean and potatoes with 3.9% and 3.7% a year, respectively. Although sugar cane yield did not grow as much as the other crops in the group, given its importance in Brazil's agriculture, the growth rate of 0.4% had a significant impact on the total agricultural production.

Yield growth of the products consisting the transitional group shows mixed trends. Yields of tea, corn and coffee increased, while those of unshelled groundnuts and cassava declined. Since the values of corn and coffee production are substantially larger than those of groundnuts and cassava, the aggregate yield of the products in this group increased. However, yields of the traditional group showed a tendency towards a moderate decline during the period under investigation.

Table 13

CROP YIELDS IN BRAZIL

Product	Average 1961-1965 (kg/ha)	Average 1974-1976 (kg/ha)	Annual growth rate (percentage)
Modern			
Potatoes	5 902	9 170	3.7
Sugar cane	43 332	45 300	0.4
Tomatoes	14 060	23 389	4.3
Soya beans	1 049	1 660	3.9
Transitional			
Corn	1 294	1 585	1.7
Coffee	462	488	0.5
Tea	317	504	3.9
Unshelled groundnuts	1 322	1 307	-0.1
Cassava	13 789	12 436	-0.9
Traditional			
Rice	1 607	1 479	-0.7
Edible beans	647	515	-1.9
Castor beans	828	887	0.6
Non-classified			
Wheat	707	891	1.9

Source: FAO, *Production Yearbook 1976*, Vol. 30, Rome, Italy, 1977.

Crop yields and their changes between 1948-1952 and 1966-1970 in the State of São Paulo are shown on table 14 and they indicate a similar pattern of changes in yield to table 13. Generally crops in the traditional group are subsistence crops which are mainly raised by small farmers, while crops in modern group are commercial and export crops which are produced by medium-sized farms.

From the above observation, it can be stated that the past development of Latin America's agriculture was mainly land extensive expansion and that farmers in the mainstream of development were medium-sized farmers who adopted modern techniques of production and attempted to respond rapidly to market stimuli.[100]

Table 14

CROP YIELDS IN SÃO PAULO

Product	Five year period (kilos/hectares)		Annual growth rate (percentage)
	1948-1952	1966-1970	
Modern			
Cotton	560	1 439	5.1
Potatoes	5 210	11 881	4.4
Sugar cane	45 600	47 099	0.2
Oranges	8 950	10 738	1.0
Tomatoes	14 010	21 096	2.2
Soya beans	950	1 437	2.2
Transitional			
Corn	1 350	1 707	1.2
Coffee	396	511	1.4
Bananas	7 710	15 955	3.9
Tea	2 333	5 289	4.4
Onions	3 580	4 784	1.5
Peanuts	1 060	1 230	0.8
Cassava	12 620	17 551	1.8
Traditional			
Rice	1 425	934	-2.2
Edible beans	650	450	-1.9
Castor beans	1 010	1 008	0.0

Source: Instituto de Economia Agrícola, *Modernization of Agriculture in the State of São Paulo*, Secretaria da Agricultura, Governo do Estado de São Paulo, São Paulo, 1973, p.46.

E. ANALYTICAL FRAMEWORK OF LATIN AMERICAN AGRICULTURAL DEVELOPMENT

Despite the rapid expansion of crop acreage and production in Latin American countries, their agriculture proved incapable of solving the major problems of unemployment and inequity, in rural areas. Our observation indicates that rapid acreage expansion had been achieved by a capital-intensive method although there were many unemployed and underemployed. In the following paragraphs an analytical framework which explains the agricultural development in the previous section and its major propositions are offered as hypotheses to be tested through further research.

Traditional production technologies would be land-intensive in the factor proportion sense, and modern technologies would be capital-intensive. In figure 4, V_t is the innovation possibility curve at the initial time period, and U_1 is the production isoquant for a given technique of production along the V_t

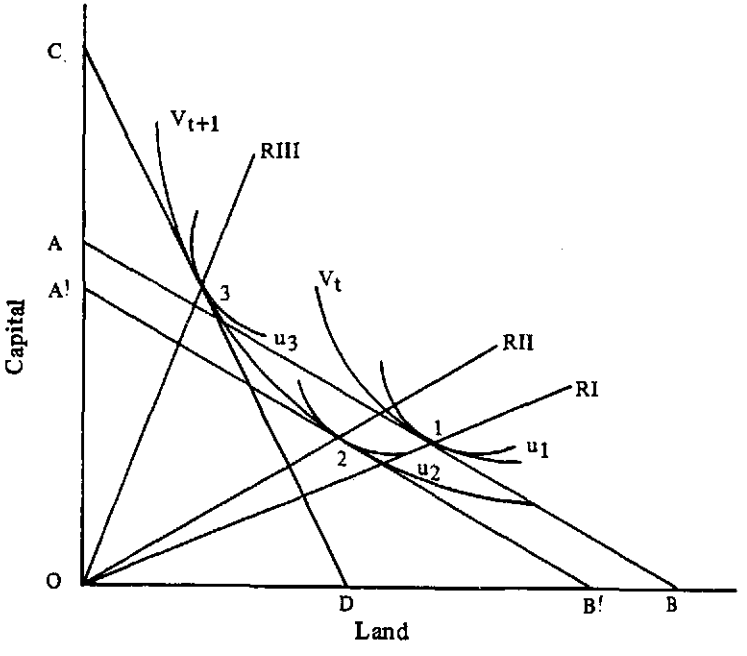
curve. With the accumulation of scientific knowledge V_t will shift to V_{t+1}. In response to changing economic conditions producers may innovate and move along a given V, or they may shift to a new V such as from V_t to V_{t+1}. Applied agricultural research, either by the producers themselves, private companies, or public institutions, helps them make these adjustments.[101]

Define AB as a unit cost line, $P_tT + P_{kt}K = 1$, where P_t and P_{kt} are the factor prices relative to product price. The tangency of this price line with V_t and production isoquant U_1 at point 1 is a point of initial equilibrium. Resources are combined in the proportion given by line RI, and profits are zero.

Now suppose V_{t+1} becomes available because of continued investments in science. This new V represents a latent demand for new production technology. Whether producers attain it or not will depend on what happens to product and factor prices, and/or to the installed capacity for applied research which provides the means of discovering new techniques.

Figure 4

INNOVATION POSSIBILITY CURVE AND PRODUCTION ISOQUANTS



First, assume that product demand is perfectly elastic and land is relatively inelastic in supply. Innovation or the adoption of new production technology on the part of farmers results in profits. This is equivalent to an increase in rate of return on resources owned. If the capital market was previously in equilibrium, the increase in the rate of return on land has to be capitalized in higher land values for the capital market to return to an equilibrium. Adopters will bid up the price of the land, which is in relatively inelastic aggregate supply, until rates of return are again at par with opportunity costs.

It should be noted that in this sense producers receive the benefits of the new production technology and that ultimately its value is capitalized into resources that are in relatively inelastic supply, in this case, land. It should also be noted that this changes the factor-price ratio, with the result that the price line AB rotates in a clockwise fashion. This would provide an incentive for innovators involved in land to augment technical change and would shift factor proportions to a point along a line lying to left of line RI such as line RIII.

Like the second case, this assumes that the demand for the product is inelastic and that the supply of land is relatively elastic. As a new production technology is adopted, output increases. With inelastic product demand, this leads to a decline in product price, which eliminates profits earned by the early adopters and imposes income losses on the non-adopters. There will be strong incentives for conventional resources to leave the sector, making for major adjustment problems. In fact, the benefits of the technical changes accrue to the consumer and temporarily to the early adopters. Non-adopters bear the burden of the adjustment costs as they are either locked in with lower incomes and returns on their owned resources or sell out for alternative employment. If relative factor prices do not change, the new equilibrium will be at point 2. For the two development patterns described above, land-scarce countries took the first type of development pattern while many Latin American countries in general took the second pattern. Even though Latin American agriculture has been developing using land extensively as a whole, there exist two types of farms, subsistence farms which cannot adopt new production technology and large farms which can adopt new technology. Their respective production functions can be described as follows:

$$Q_S = fs\ (VI \quad K, AL, L) \qquad 1)$$

$$Q_l = f_l\ (VI, AL, L \quad K) \qquad 2)$$

where

Q_S: output of subsistence farm,

Q_l: output of large farm,

VI: current inputs such as fertilizer, seeds, etc.,

K: capital,

AL: land, and

L: labour.

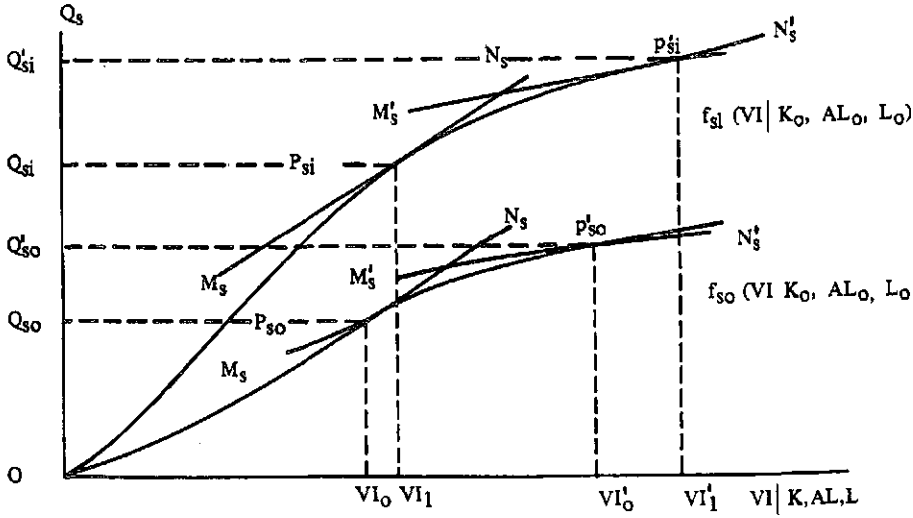
Among the inputs in each production function, inputs to the left of the bar are relatively easily changeable and available inputs and will be called variable inputs in the following analysis, whereas those on the right side of the bar are inflexible inputs and will be called fixed inputs. In the case of small farms, current inputs are variable inputs and the return of production activities accrue to the fixed inputs such as capital, land and family labour.[102] As regards large farms, on the contrary, current inputs, land and hired labour are variable inputs and capital is the fixed input. Returns of production activities accrue to capital which is the fixed input.

If small farmers face production function 1), they will increase using current inputs until marginal revenue from current inputs (V_1) equals their marginal costs. Returns of production fall on capital, land and family labour. On the other hand, if large farmers face production function 2), they apply the least cost combination of current inputs, land and labour until their marginal revenues equal their marginal costs and obtain returns of production on capital. Since land is a relatively inexpensive input for the large farmers, they use more land in comparison to other inputs.

There are two ways of increasing returns on small farms with a given amount of fixed inputs. One is to shift the production function upwards from f_{so} to f_{sl} and to attain production point p_{sl} as shown in figure 5. This means

Figure 5

TECHNOLOGICAL PROGRESS

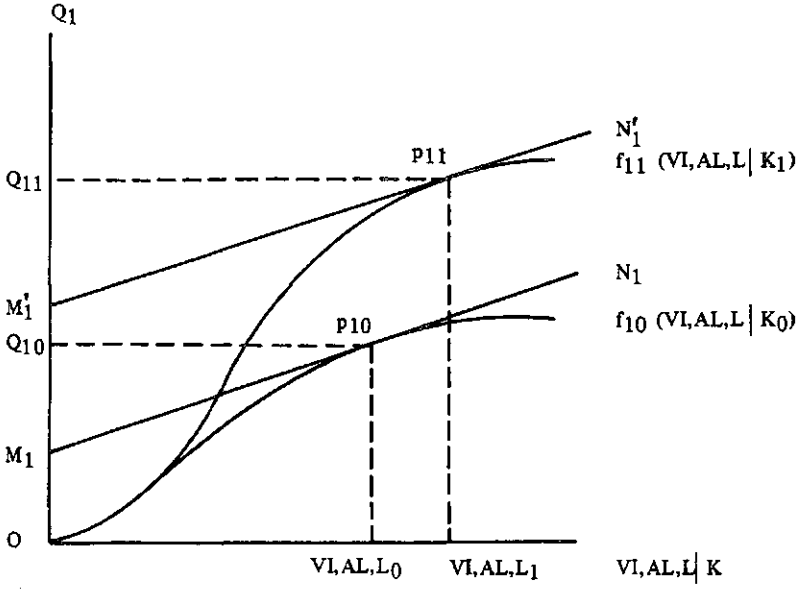


introducing new chemical and biological technology and increasing yields per unit of land. The other way is to reduce current input prices and to turn current input price line $M_S N_S$ in a clockwise fashion to $M_S^1 N_S^1$. Then line $M_S^1 N_S^1$ touches production function f_S at higher point p_{SO}.

There are also two ways of increasing returns on large farms with a given amount of capital input. As described in the case of small farms, one of them is to shift production function f_1 upwards by introducing new chemical and biological technology. The other way is to introduce a large amount of capital K_1 instead of K_0 and to achieve economies of scale by using a relatively cheap input, land. In figure 6, production function f_{10} is a production frontier with capital input K_0. When that amount of capital is used, an equilibrium point is p_{10} where a price line of the least cost combination of current inputs touches production function f_{10}. When the amount of capital input is increased to K_1, the production function will shift to f_{11} from f_{10}, and the equilibrium point is p_{11} where the cost line touches the production function. Due to the change in capital input, profits on capital increase from OM_1 to OM_1^1. Past empirical analysis in the United States and Brazil shows there is also an economy of scale in large-scale production in agriculture.[103] As regards the results, production point p_{11} produces higher rates of return on a unit of capital than production point p_{10} does. So the farmers who

Figure 6

SCALE ECONOMY



can obtain access to capital markets and credits, mainly large farmers, expand capital inputs and obtain higher returns on capital. When they use higher capital input, they also increase variable inputs from VI, AL, L_0 to VI, AL, L_1 as shown on figure 6. Using easily available foreign technology and production methods which employ large machinery, the large farmers expand land input and increase their agricultural output. Since land is a relatively cheap and abundant input in comparison with other inputs, Latin America's agriculture as a whole adopted that development pattern which exploits land extensively in the 1950s and 1960s. The main participants in this type of development were medium-sized farmers who 1) had easy access to capital markets and new technology and 2) could afford to purchase relative cheap capital inputs in comparison with current inputs such as fertilizers and insecticide. Since current inputs have been relatively expensive and new chemical and biological technology to increase crop yields has not been easily available, small farmers were left behind by the progress of agriculture in the past.

F. FACTORS WHICH AFFECTED PAST AGRICULTURAL DEVELOPMENT

As we have seen in the previous sections, the main participants in past agricultural development have been medium-sized farmers who introduced foreign technology and expanded their farms. In this section, we will use data now available to investigate some causes which have led to this pattern of development. Since the data is not recent, it may not reflect the present situations accurately and we suppose that present conditions are much better than the data implies.

1. Yield growth and number of experiments

The change in yields in table 13 partly reflect the number of experimental projects shown in table 15 which were undertaken in Brazil in 1961. Although rice and edible beans ranked first and fifth in importance among the major crops in 1966, the number of experimental projects in 1961 were 49 and 45, respectively. The number was much smaller than in the case of corn, surgar cane and wheat whose growth rates were 1.7%, 0.4% and 1.9%, respectively, between 1961-1965 and 1974-1976. This small number of experimented projects in the early part of the 1960s might have been one of main causes for declining yields of rice and edible beans.

Since rice and edible beans are among the most valuable crops, the declines in their yields have quite a significant economic impact on the agricultural sector. Because these two products have not been the major export products in spite of their high production values, they must have been produced on small farms and been important food crops for farmers. Furthermore, the Brazilian Government might have been not interested in improving their productivities and yields since they did not earn foreign exchange.

Table 15

TWELVE IMPORTANT CROPS AND NUMBER OF EXPERIMENTS

	In 1966		Rank	In 1961 number of experiments
	Area cultivated (1 000 ha)	Value of production (1 000 ner$)		
Rice	4 005	865.4	1	49
Corn	8 703	810.6	2	158
Sugar cane	1 636	656.9	3	289
Coffee	3 632	604.7	4	59
Edible beans	3 325	577.6	5	45
Cotton	3 898	512.3	6	55
Mandioca	1 780	473.0	7	38
Bananas	245	228.6	8	...
Potatoes	199	222.4	9	80
Wheat	717	156.1	10	103
Oranges	165	122.4	11	...
Cocoa	456	97.7	12	...

Source: Schuh, G. Edward, *The Agricultural Development of Brazil*, Praeger Publisher: New York, 1970, pp.104-5 and pp.232-3.

The same pattern can also be observed in Mexico. Table 16 shows numbers and percentage shares of farmers by crop, while table 17 shows crop yields. In the former table, 66.4% of the smallest farmers grow corn, and only 10.1% and 1.4% of the smallest farmers plant pulses and wheat, respectively. These figures indicate that, for the smaller farmers, corn is the most important crop which may be mainly consumed by themselves and partly sold outside farms. But, for the larger farmers, the weight of wheat increases significantly as a major crop. As indicated by the latter table, yields went up by 5.1% and 1.5% for wheat and maize, between 1961-1965 and 1974-1976, respectively and yield growth is the highest for wheat whose major growers are the largest farmers.

The main causes of the low yield growth for those crops mainly grown by smaller farmers can be identified in table 18 which shows levels of input utilization and mechanization among farmers. Among the inputs, the first three (high yield seeds, fertilizers and pesticide) affect mainly yields of crop, whereas the last three (tractor, draft animal and mechanization) influence labour productivity per crop. As the table shows, the levels of utilization of the first three inputs are very low among smaller farmers compared to larger farmers. This situation may be at the root of major problems, such as the inappropriate policies followed by many extension services, relatively higher prices of the first three inputs and a lack of knowledge about complementarities among inputs.

Table 16

NUMBERS AND PERCENTAGE SHARES OF FARMERS BY CROP

(No. 1 000)

	Maize			Pulses			Wheat			Rice		
	Num-ber	% of crop	% of total	Num-ber	% of crop	% of total	Num-ber	%of crop	% of total	Num-ber	% of crop	% of total
Total	**1 691.9**	**66.2**	**100.0**	**346.4**	**13.6**	**100.0**	**80.9**	**3.2**	**100.0**	**41.1**	**1.6**	**100.0**
Undersubsistence	945.3	66.4	55.9	148.2	10.1	41.3	20.0	1.4	24.7	6.0	0.4	14.6
Subsistence	296.2	71.5	17.5	79.3	19.1	22.9	15.6	3.8	19.3	6.4	1.6	15.6
Simple reproduction	118.9	71.7	7.0	34.1	20.6	9.8	7.0	4.2	8.7	4.7	2.8	11.4
Farm with surplus	135.7	64.7	8.0	41.2	19.6	11.9	15.4	7.3	19.0	10.3	4.9	25.1
Transitional	174.8	58.8	10.3	42.5	14.3	12.3	17.1	5.8	21.1	11.3	3.3	27.5
Small	13.7	47.0	0.8	4.2	14.5	1.2	2.4	8.2	3.0	1.3	4.5	3.2
Medium	4.1	42.0	0.2	1.1	11.0	0.3	1.5	15.3	1.9	0.5	5.1	1.2
Large	3.2	37.9	0.2	0.8	9.9	0.2	1.9	22.3	2.3	0.5	6.3	1.2

Source: ECLAC: "*Economía campesina y agricultura empresarial: Tipología de productores del agro mexicano*", unpublished document.

Table 17

CROP YIELDS IN MEXICO

Product	Average 1961-1965 (kg/ha)	Average 1974-1976 (kg/ha)	Annual growth rate (percentage)
Maize	1 059	1 270	1.5
Pulses	458	662	3.1
Wheat	2 085	3 802	5.1
Rice	2 290	2 737	1.5

Source: FAO, *Production Yearbook*, 1976, Vol. 30, Rome, Italy, 1977.

Table 18

LEVELS OF INPUT UTILIZATION AND MECHANIZATION AMONG FARMS IN MEXICO

(Percentages)

Farm \ Input	HYV	Fertilizer	Pesticide	Tractor	Draft animal	Mechanization
Total	11.9	24.5	10.7	21.1	65.8	13.8
Infrasubsistence	4.7	18.1	3.0	10.3	69.5	5.9
Subsistence	10.7	18.8	8.5	17.9	66.5	10.1
Break even	14.8	22.8	11.8	25.0	64.5	14.3
Surplus	22.6	31.3	17.1	34.3	55.9	25.3
Transitional	29.2	48.3	33.5	50.8	59.1	35.2
Small	43.7	65.8	55.8	74.9	50.1	62.9
Medium	51.0	73.3	65.8	84.6	45.3	79.5
Large	59.3	82.6	76.5	91.1	42.2	89.6

Source: ECLAC, "Economía campesina y agricultura empresarial: Tipología de productores del agro mexicano", unpublished document.

2. High relative price of chemical inputs

During the 1948-1953 period, price indexes for inputs used for São Paulo agriculture underwent a substantial decline in comparison to the prices received for the State's agricultural products as shown in table 19. But during the next 16 years from 1954 to 1968, price indexes for inputs increased substantially in comparison to the prices received. In general terms, the relationship between prices paid and prices received was somewhat more favourable for agriculture during the initial part of the period analysed.

Table 19

PRICES INDICES FOR SÃO PAULO AGRICULTURE

	Prices	Prices received (1)		Prices	
	Paid(1)	21 products	21 products less coffee	Paid(2)	Received(2)
1948	107	90	103		
1949	105	94	102		
1950	98	109	95		
1951	95	103	99		
1952	95	102	102		
1953	96	109	108		
1954	102	115	98		
1955	106	110	105		
1956	108	104	105		
1957	108	98	99		
1958	109	84	96		
1959	118	82	98		
1960	117	89	107		
1961	114	91	111		
1962	114	99	120		
1963	117	98	113		
1964	110	104	110		
1965	119	85	100		
1966	106	87	111	100	100
1967	101	77	95		
1968	104	76	90		
1969	105	87	95		
1970	101	90	92	82	94
1971				83	99
1972				86	109
1973				93	137
1974				126	134
1975				138	136
1976				118	154
1977				121	162

Source: (1) Instituto de Economia Agrícola. *Modernization of Agriculture in the State of São Paulo.* Secretaria de Agricultura, Governo do Estado de São Paulo, 1975, p.84.

(2) *Conjuntura Econômica*, Vol. 32, No. 6 (June 1978), pp.147-86.

Note: All prices are in real terms.

Over the next period (1954-1968), the parity index became increasingly less favourable towards agriculture, in spite of declining input prices. In the third period (1969-1977), the trend changed and the prices received increased substantially compared to the prices paid mainly due to the world-wide shortages of agricultural products.

Within the overall picture there existed, however, groups of inputs whose price trends were considerably different from aggregated inputs. Table 20 shows the quantities of major crops required to purchase 10 tons of fertilizer and those of the same crops required to purchase a 44 horse power tractor during the 1967-1978 period. As can be observed in 1967, a 44 horse power tractor could be acquired with 727 sacks of rice, 2 147 sacks of corn or 1 105 sacks of soya beans. In 1978, it could be purchased only with 422 sacks of rice, 1 046 sacks of corn or 603 sacks of soya beans. In 1967, ten tons of fertilizer could be purchased with 100 sacks of rice, 290 sacks of maize or 150 sacks of soya beans. The fertilizer price declined slightly and the fertilizer still required 92 sacks of rice, 228 sacks of maize or 162 sacks of soya beans in 1978. On the average, the price indexes of fertilizer have declined slightly, while the tractor price has gone down by almost 50% in relation to the prices of major crops. As a result, fertilizers were relatively more expensive in 1978 than in 1967 in comparison to machinery.

It should be noted that yields of most crops in Latin America are much lower than in other parts of the world. Data on a selected group of crops are presented in table 21 in comparison with major producing countries of the world. It is clear that a country with such an abundant supply of land as most Latin American countries will not achieve the same yields as countries in which land is more scarce. The substitution of the relatively inexpensive land for other inputs would tend to make yields per unit of land low. However, the comparison does indicate the potential for raising yields and the role small farmers could play as major food suppliers to their domestic markets. Moreover, increasing yields will help to raise labour productivity and, in turn, the real returns of labour on the small farms.

In order to increase yields in the agricultural sector, it will be especially necessary to introduce modern inputs into the production process of small farmers. These mainly include, fertilizers, high yield seeds and insecticide. Some of these are not available. Otherwise, even if they are available, their prices in relation to other inputs as well as to fertilizer prices in other countries are so high that it does not pay to use them. Data on fertilizer price ratios are given in table 22 with data available for Argentina and Mexico alone among Latin American countries. In order to buy a unit of urea, Argentine farmers have to pay 163% more wheat than American farmers and 111% more than Japanese farmers. In the case of rice the situation is more impressive when compared with the United States. The Argentine farmer needs 518% more rice to buy one unit of urea fertilizer. The Mexican farmer also has to spend 173 more sugar cane to buy a unit of urea than his American counterpart. Thus, in terms of products, urea fertilizer is relatively more expensive in Argentina than in the other countries. The differences in relative prices are approximately the same for the other plant nutrients. Consequently, a major reason for the failure to adopt fertilizer on very small farms is relatively high input prices.

Table 20

AGRICULTURE PRODUCE REQUIRED TO PURCHASE A TRACTOR (44 HP) AND 10 TONS OF FERTILIZER IN SÃO PAULO, 1967-1978

	Tractor						Fertilizer					
	Rice paddy		Corn		Soya beans		Rice paddy		Corn		Soya beans	
	SC. 60kg	Index	SC. 60kg	Index	SC. 60kg	Index	SC. 60kg	Index	SC. 60Kg	Index	SC. 60kg	Index
1965												
1966												
1967	727	100	2 147	100	1 105	100	100	100	290	100	150	100
1968	729	100	2 595	121	973	88	100	100	360	124	130	87
1969	834	115	1 717	80	928	84	110	110	240	83	130	87
1970	881	121	1 698	79	754	68	130	130	250	86	110	73
1971	524	72	1 531	71	684	62	80	80	250	86	110	73
1972	518	71	1 475	69	681	62	90	90	260	90	120	80
1973	499	69	979	45	456	41	100	100	200	69	90	60
1974	362	50	927	43	443	40	170	170	450	155	210	140
1975	302	41	818	38	473	43	76	76	207	71	120	80
1976	617	85	1 064	50	561	51	106	106	183	63	96	64
1977	598	82	1 363	63	545	49	148	148	337	116	136	90
1978	422	58	1 046	68	603	54	92	92	228	79	162	108

Source: Instituto de Economia Agrícola, *Prognostico 78/79*, Secretaria de Agricultura, Governo do Estado de São Paulo, 1978, p. 46 and p. 55.

Table 21

COMPARATIVE YIELDS OF SELECTED CROPS, LATIN AMERICA AND OTHER COUNTRIES

(Kg/ha)

	Latin America		Other countries	
	1975-1977		1975-1977	
Wheat	S. America	1 252	Canada	1 946
	Mexico	3 575	U.S.A.	2 050
	Argentina	1 561	India	1 380
	Brazil	743		
Rice	S. America	1 846	U.S.A.	5 094
	Mexico	2 826	India	1 799
	Argentina	3 623	Japan	5 952
	Brazil	1 512		
Maize	S. America	1 740	U.S.A.	5 546
	Mexico	1 221	Thailand	2 038
	Argentina	2 634	Yugoslavia	4 018
	Brazil	1 599		
Potatoes	S. America	9 095	U.S.A.	28 995
	Mexico	12 319	West Germany	26 050
	Argentina	14 054		
	Brazil	9 144		
Pulses	S. America	554	U.S.A.	1 314
	Mexico	589	Italy	1 267
	Argentina	1 151	Pakistan	536
	Brazil	502		
Soya beans	Brazil	1 721	U.S.A.	1 896
	Mexico	1 825		
Sugar cane	S. America	55 610	U.S.A.	82 748
	Mexico	66 883	India	51 460
	Brazil	50 089		

Source: FAO, *Production Yearbook 1977*, Vol. 31, Rome, Italy, 1978.

3. Economies of scale in corn production

The previous section states that economies of scale exist in agricultural production. As one example, table 23 shows a comparison of costs between animal and motorized cultivation methods. Using the same amount of seeds and fertilizer, animal cultivation produces 2 460 kg per hectare, while motorized cultivation produces 3 000 kg per hectare. With the exception of seeds and fertilizer, both methods employ different quantity of inputs as a result of the substitution of labour by machinery. The costs per hectare amount to 691.32

cruzeiros and 797.61 cruzeiros respectively for animal and motorized cultivation. Even though the costs per hectare are higher in the case of motorized cultivation, the costs per ton are lower (265.87 cruzeiros) in the case of motorized cultivation than with animal cultivation (281.02 cruzeiros), since the former produces a higher yield. As described, a large-scale farm produces a unit of output at lower cost and has an economic advantage over a small farm. This economy of scale could be one source of the extremely high returns on capital investments which were found in the previous year's study.

Table 22

RATIO OF FERTILIZER PRICE TO PRODUCT PRICE SELECTED PRODUCTS AND UREA

(Price of Urea/kg/price of product/kg)

	Argentina	Mexico	U.S.A.	Japan
Wheat	7.74	...	2.94	3.50
Corn	8.70	...	4.17	...
Rice	10.44	...	1.69	...
Sugar cane	...	40.55	14.85	...

Source: FAO, *Production Yearbook 1975*, Vol. 29, Rome, Italy, 1976.
Note: (1) Figures are average ratios during the 1970 and 1971 period.
(2) Product prices are prices received by farmers, whereas fertilizer prices are prices paid by farmers.
(3) Rice does not include husked rice.

Table 23

COST COMPARISON BETWEEN ANIMAL TRACTION AND MOTORIZED TRACTION FOR CORN PRODUCTION

	Animal traction	Motorized traction
Yield (kg/ha)	2 460	3 000
Labour cost (cz/ha)	287.20	179.70
Seeds (cz/ha)	19.95	19.95
Fertilizer (cz/ha)	202.95	202.95
Chemical (cz/ha)	-	-
Other inputs (cz/ha)	172.49	323.57
Depreciation (cz/ha)	8.73	71.44
Costs (cz)		
Ha	691.32	797.61
Ton	281.02	265.87

Source: Instituto de Economia Agrícola, *Prognostico 3/74*, Secretaria da Agricultura, Governo do Estado de São Paulo, São Paulo, 1973, p. 3-3.

In addition to the three factors mentioned above, there may be other factors which led to Latin America's pattern of agricultural development. Some of these factors are marketing systems for agricultural inputs and outputs, agricultural credit systems and trade policies. Due to lack of data, it is impossible to identify with certainty any concrete effects of these factors on the pattern of agricultural development. However, several reports indicate that these factors also have been working in favour of medium-sized and large farms.[104] Consequently the major factors analysed above together with marketing systems, credit systems and trade policies formed the past development pattern of Latin America's agriculture.

G. ECONOMIC AND TECHNICAL CO-OPERATION BETWEEN LATIN AMERICA AND JAPAN

As described above, the main problems to be tackled are expansion of agricultural production which supplies large amounts of agricultural produce to domestic as well as export markets and reduction of the income gap between small and large farmers. Although Latin America has a vast land area, some countries have not attained self-sufficiency in food. Some other countries such as Argentina and Brazil export food and feed grains. Even though they export grains, their export have not been stable. One of the factors which created export fluctuations is the climate. Another factor is the change in consumption patterns of foods particularly as a result of the increase in per capita income. As per capita income increases, the demand for livestock products which require a large amount of feed grains increases in the domestic markets. Such phenomena can be observed in many countries in Latin America and in spite of favourable population to land ratios for the expansion of agricultural land area, their exports have not expanded significantly.

Unequal distribution of land among farmers is the salient feature of agriculture in the region. In many cases, agrarian reform has not been fully carried out mainly due to the social and political climates of the countries concerned. The agricultural technology on both large farms (*latifundios*, particularly cattle-raising farms) and small farms (*minifundio*) is traditional in many Latin American countries and both labour and land productivities of the large farms are considerably lower than those of the developed countries.

New medium and large industrial farms which introduce modern technology have been developing and their agricultural productivity has been much higher than that of large and small farms which use traditional technology. Since the technology adopted by the new medium and large industrial farms is efficient with high-yielding varieties and mechanized farming systems, the production of several crops has increased significantly. When those farms grow maize, beans and cassava which are usually raised by small farmers who market only a small part of those crops, the small farmers will face serious problems. The small farmers cannot compete with the modernized farms on the markets. Also the mechanized farming systems of the modernized farms will deprive small farmers of job opportunities on large farms. This situation will widen the

income gap between small and large farmers in the absence of policies to encourage small farmers to adopt new farming technology or to create job opportunities for small farmers.

There are two paths open to technical and economic co-operation between Japan and Latin America; one is direct financial co-operation for agricultural development and the other technical co-operation. Public and private financial co-operation between Japan and Latin America in the field of agriculture has so far mostly been concentrated in Brazil where Japan has invested in development of livestock industry, feed grains and soya bean farms. Japan has invested in Australian agriculture, too. In this case, it has been mostly for raising cattles. These investments for agricultural development in Brazil and Australia have mostly been from the private sources. The public investments for agricultural development in Brazil are in cerrado areas for development of farms which grow mainly maize and soya bean.

As described above, the main participants in agricultural progress in the past were medium and large farmers who have access to capital markets and new mechanized technology, while the majority of small farmers were left behind by progress. Even though it is difficult to prove that income distribution worsened the past pattern of agricultural development probably widened gap in income distribution between small and large farmers. To close the gap and to simultaneously attain further economic growth, the small farmers who were left behind by progress have to be brought back into the mainstream of development and become major participants in progress.

From our analysis in the previous sections, we can identify two approaches to integrate the small farmers who own limited resources. At present the small farmers employ traditional production methods with relatively expensive variable inputs such as fertilizers and their yields are low. One way to increase their yields is through development of new chemical and biological technology available to small farmers. If the new technology prevails among them, their production function shifts upwards and their production increases even with the present amount of inputs. The new technology will change the past pattern of yield growth in which yields of rice and edible beans declined.

The other way is to bring down the relatively high prices of fertilizers. Even with present technology, yields will go up with larger amount of fertilizers if fertilizer prices decline. This price change alone leads to increased fertilizer application and raises output. Together with the new chemical and biological technology, the decline of fertilizer prices shifts the production level upward and substantially increases output. The two methods of increasing yields and total production mentioned can be undertaken by the small farmers with assistance from governmental policies. In addition to the new chemical and biological technology, mechanized farming technology with small-scale machinery may benefit small farmers. Even though small farmers usually have plenty of family labour during the off-harvest season, they often suffer from labour shortages during the harvest season. A shortage of labour is one of the serious constraints affecting small farmers' ability to increase output. If they can introduce mechanized farming technology with small-scale machinery, they can remove the labour shortage constraint and exploit earning opportunities.

In relation to Latin America's present agricultural problems which we described above, we shall consider what type of co-operation can solve the problems and strengthen the economic ties between Japan and Latin America. The three approaches for increasing productivity, expanding output and attaining equity in the future are: i) to close the gap between technically potential yields and actual yields through institutional innovation such as the improvement of extension systems, credit facilities and input distribution; ii) to develop new chemical and biological technology suitable for Latin American farmers and iii) to improve infrastructure which raises yields of farm land. Output and productivity can be increased through any of these approaches either by raising yields or by more intensive use of land in multiple cropping systems which significantly absorb underemployed rural labour forces.

Japanese technology which was developed over recent decades is suitable for adoption on small- and medium-sized family farms and is likely to enhance the utilization of available rural resources, in particular the labour force. The type of new technology which is appropriate will differ from one country to another depending on the capacity of a society to effectively mobilize surplus labour for productive purposes. In relation to the three approaches above, economic and technical co-operation between Latin America and Japan can be summarized more specifically as follows:

1) With regard to financing problems, Japan has already financed farms in Brazil and some other countries in the region. Japan would be able to provide future finance for the development of agriculture including land development and construction of infrastructure (i.e., irrigation feeder roads, etc.) in these countries and others. However, it should be noticed that this depends on what strategies are adopted by each country.

2) Since the strategies recently adopted by CIAT and other international institutes concerned with agriculture lay emphasis on the improvement of agriculture on small and medium farms, technical co-operation with small farmers including measures to encourage their organization would be required. Japan has long history of intensive farming and organization of small and medium farmers, e.g., agricultural co-operatives, so that technical co-operation in these fields would be most suitable for Japan.

3) Japan had already sent some experts in rice, vegetables and fruit growing with the aim of helping small and medium farmers to intensify farming in some Latin American countries. Such co-operation includes processing of agricultural products. Such technical co-operation would be pursued in the future at the request of the countries concerned.

4) There is another means of technical co-operation involving the development of new technologies from Japan for the betterment of basic research in agricultural sciences suitable for small farmers. Japan has a large number of basic research workers such as plant breeders, plant physiologists, plant pathologists and soil scientists. They can co-operate with their counterparts in the countries of Latin America who know local conditions better.

5) Historically, technological and institutional innovations considerably contributed to the agricultural development in Japan after the Meiji Restoration. Since Japan has considerable experience of organizing farmers for the diffusion of new technology, improvements of credit and marketing facilities, Japanese experts could give guidance to small and medium farmers for the improvement of the institutions mentioned above.

There may be other approaches to expanding agricultural production and to bring in the small and medium-sized farmers back into the mainstream of economic progress, however, they may be too expensive for most of the countries in Latin America. We think that the three approaches outlined above are irksome but essential components for further progress at the present stage of Latin American economic development.

Chapter 5

NEW FORMS OF CO-OPERATION IN MARITIME TRANSPORT

Introduction

The rapid expansion of international trade after the end of the Second World War was supported by large-scale structural changes in the world maritime transport system accompanied by technological innovations in shipbuilding and an increase in the tonnage of ship.

Economic relations between Japan and Latin American countries will become closer in the future, and the establishment of a more efficient maritime transport system between them will be crucial, since there has been a considerable delay in the introduction of maritime transport technologies.

This chapter discusses the basic technological as well as institutional problems with respect to the new forms of co-operation in the fields of maritime transport, recognizing that the development of maritime transport between Latin America and Japan will contribute to closer economic relations between the two regions and will lead to mutual benefits.

Since Latin America is a very large area and not homogenous, this study deals only with two regions: the Andean countries on the Pacific Ocean side of South America (Colombia, Ecuador, Peru, Bolivia and Chile) where the introduction of technology has been relatively delayed, and Brazil on the Atlantic side which has abundant natural resources and increasingly closer economic relations with Japan.

A. BASIC PROBLEMS OF LATIN AMERICAN MARITIME TRANSPORT

1. The situation in world maritime transport

One of the problems of Latin American maritime transport is that the Latin American countries' share of total world tonnage is not only very small, but is also gradually decreasing and this has resulted in a drop in the relative position of the area in world shipping. As shown in table 1, total tonnage increased from 4.8 million tons in 1965 to 12.1 million tons in 1978, but the share dropped from

3.2 to 3.0% over the same period. This trend is even clearer from the following figures. When the figure for 1965 is taken as 100, the increase in tonnage by 1978 was 273 for the world as a whole, but in Latin America, it was 252. The rate of increase was much lower than that of 733 for Africa and 376 for Asia during the same period.

2. Disparate of development

Table 2 shows the changes in the shares of each type of ship. It is clear from the table that the introduction of such ships as bulk carriers, combination carriers such as O/B and O/B/O, container vessels and refrigerated ships has been delayed. However, new technology is gradualllly being introduced in Latin America.

Table 1

SHARES OF LATIN AMERICAN SHIPS IN WORLD MARITIME TRANSPORT (GROSS TONNAGE)

(Millions of tons)

	1965	1970	1975	1976	1977	1978	Index 1978 1965 = 100
World	146.8 (100.0)	217.9 (100.0)	336.9 (100.0)	367.1 (100.0)	388.5 (100.0)	400.7 (100.0)	273.0
Latin America	4.8 (3.2)	6.4 (2.9)	9.0 (2.6)	9.8 (2.7)	10.8 (2.7)	12.1 (3.0)	252.0
Africa	0.6 (0.4)	0.8 (0.4)	1.8 (0.6)	2.5 (0.7)	3.8 (1.0)	4.4 (1.1)	733.0
Asia	5.5 (3.8)	8.0 (3.7)	11.8 (3.5)	15.0 (4.1)	18.2 (4.7)	20.6 (5.1)	376.0

Source: UNCTAD, Review of Maritime Transport 1976 (1965, 1970, 1975 and 1976) and 1978 (for 1977 and 1978).

Table 2

SHARE OF LATIN AMERICA IN THE WORLD VESSELS IN USE

	1965	1970	1975	1976	1977	1978
Tanker	3.2	2.8	2.5	2.3	2.2	2.4
Ore, bulk, O/B	0.9	1.4	1.7	1.9	2.1	2.5
Container	-	-	-	-	-	-
General cargo	3.3	4.3	4.6	4.7	5.1	5.4
Others	...	2.5	2.5	2.7	3.2	3.3
All types	3.2	2.9	2.6	2.7	2.8	3.0

Source: UNCTAD, Review of Maritime Transport 1976 (for 1965, 1970, 1975-1976) and 1978 (1977, 1978).

Table 3

SHARES OF LATIN AMERICA IN THE WORLD TONNAGE OF VESSELS ON ORDER (DWT)

(Millions of DWT: percentages)

	1976[a]	1977[a]	1978[a]
All ships	103.5 (7.1)	65.7 (9.6)	41.0 (13.4)
Tanker (150 000 DWT or more)	38.6 (2.9)	17.2 (6.6)	7.9 (14.3)
Tanker (under 150 000 DWT)	12.3 (4.8)	7.4 (4.3)	5.6 (7.2)
O/B O/B/O	5.5 (24.4)	3.2 (38.6)	1.9 (42.5)
Bulk carrier	25.8 (10.2)	18.1 (13.5)	10.2 (21.6)
Full container	2.3 (2.1)	1.9 (1.7)	1.8 (1.2)
Semi container	0.1 (48.5)	0.3 (16.1)	0.2 (6.6)
Ro/Rc cargo ships	1.2 (0.4)	1.6 (1.8)	1.4 (3.9)
General cargo ships	11.4 (12.9)	10.7 (8.7)	7.7 (10.4)
Other ships	6.3 (1.6)	5.3 (2.3)	4.2 (0.7)

Source: UNCTAD, Review of Maritime Transport, 1978 (table 18).
[a]As of 30 September 1976, 1977, 1978.

For example, according to the report of a maritime transport specialist (Sepúlveda-Whittle of ECLAC),[105] services using container ships have already started and examples include the routes by Sealand and Delta Line between the United States and Brazil, the route from Miami to Manta in Ecuador by CCT, the routes between the United States and Central America, and quite recently the route between N.W. Europe and the ports of the east coast of South America. Another example is the tendency to introduce new technology into the region as can be seen from the various types of ships which have been ordered. Table 3

shows the tonnage of ships on order throughout the World together with Latin America's share of this tonnage. It should be pointed out that there is a tendency to increase the number of combination carriers such as O/B, O/B/O and semi-container vessels in Latin America. Full container vessels were introduced after 1975.

However, one of the characteristics of maritime transport in Latin American countries is the disparity of the regional distribution of the introduction of shipping technology. According to ECLAC studies,[106] Latin America is divided into the following four regions in accordance with the degree of introduction of maritime technology.[107]

1) The west coast of Latin America: this is the region along the Pacific Ocean from Mexico to Chile including the Andean countries. The introduction of maritime technology has so far been slowest in this region.[108]
2) The Caribbean coastal area: this is the area of Mexico and Central America on the Caribbean side. It is little developed with the exception of two or three specific ports. RO/RO services are still limited to a few ports.[109]
3) The northern and eastern coasts of South America: this region stretches from the Caribbean coast to Brazil and Argentina. There are a few full container and LASH ships in this area. However, the region lacks special container terminals and since cargo handling technology has not progressed on the Latin American side, it is difficult to say that these ships are efficiently operated.[110]
4) The Caribbean area: modern technology has been completely introduced into this area. Ports can handle RO/RO, full container and LASH ships and the harbour facilities have been provided.

This inequality resulting from technical backwardness and development is one of the causes of the imbalance and instability of exports and imports in the region. This is analysed in section B-3

3. Institutional problems

The most difficult problem to solve in Latin American maritime transport does not involve the hardware mentioned above, but the institutional problems as stressed by Sepúlveda-Whittle.[111] For example, it was pointed out that Latin American shipping development is being hindered by such matters as complex bureaucratic procedures for imports and exports, inefficient cargo handling in ports and a high tax on shipping charges. However, efforts are recently being made, mainly by ECLAC, to improve harbour administration in Latin American countries, and measures are being considered including those related to the legal and administrative sectors.[112]

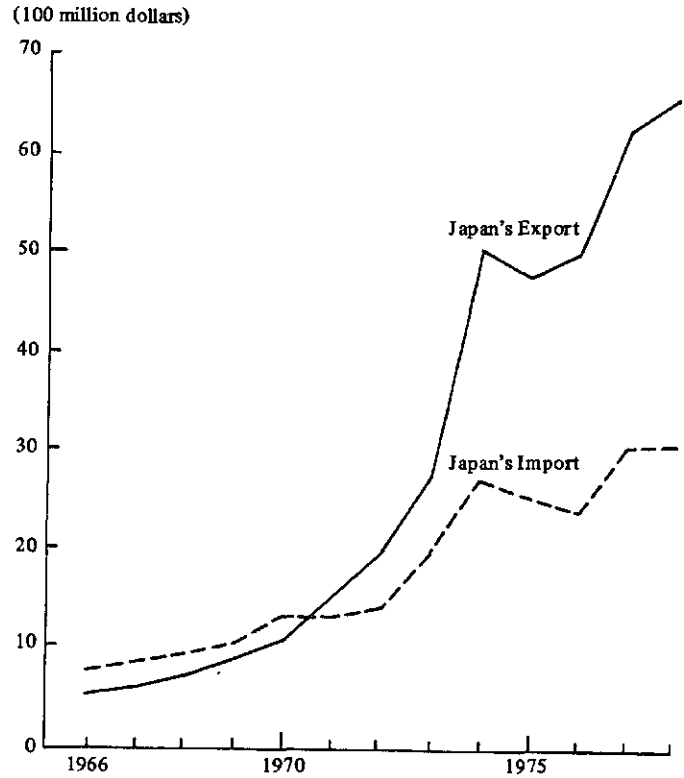
B. CHARACTERISTICS AND PROBLEMS OF MARITIME TRANSPORT BETWEEN JAPAN AND LATIN AMERICA

1. Main characteristics

With regard to the course of trade between Japan and Latin America which is a prerequisite for maritime transport between the two areas, it can be pointed out that there has been a remarkable increase in Japanese exports to Latin America in recent years. This trend started in 1971 and had become considerable by 1974 (see figure 1). According to the trade figures for 1978, the total value of Japanese exports to Latin America was US$ 6.62 billion, while imports were valued at US$ 3.05 billion, indicating that imports did not reach even half the value of

Figure 1

TREND OF TRADE BETWEEN JAPAN AND LATIN AMERICA, 1966-1978



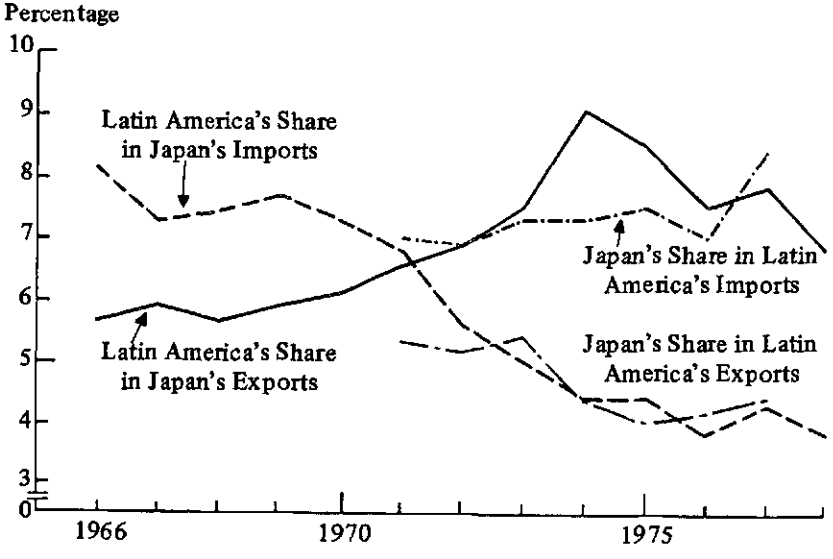
Source: Tsusho-Hakusho (White Paper on Japanese Foreign Trade, 1976 and 1979).

exports. The Latin American share of total Japanese exports tended to increase gradually up to 1974, while the Latin American share of total Japanese imports has shown a gradual decline. However, the Japanese shares of total exports and imports as seen from the Latin American side rose from 3.3% and 3.8% respectively on average between 1961-1966 to 4.7% and 7.3% respectively on average between 1971-1977 which shows a considerable increase of the Japanese share of imports. The share of total imports from Japan to Latin America has tended to increase since 1974 (see figure 2).

When the above trade figures are observed on a weight basis for each type of goods in 1978, Latin America accounted for 5.3% of the total of 72.6 million tons exported from Japan. Within the different types of goods, this figure was 5.8% for bulk cargo and 4.3% for general cargo. On a ton-mile basis, the above rates were 9.5%, 10.1% and 8.3% respectively or about double the former, reflecting the long distance between Japan and Latin America. Imports from Latin America to Japan accounted for 6.8% of Japan's total imports of 566.4 million tons. The figures were 13.8% for bulk cargo and 4.4% for general cargo, with the percentage of bulk goods being much higher. On a ton-mile basis, the

Figure 2

TREND OF SHARES OF LATIN AMERICA AND JAPAN IN TRADES BETWEEN JAPAN AND LATIN AMERICA



Source: 1) For Japan, Tsusho-Hakusho 1976 and 1979.
2) For Latin America, IDB, *Economic and Social Progress in Latin America*, 1978.

Table 4

COMMODITY STRUCTURE OF JAPAN'S MARITIME TRANSPORT IN FOREIGN TRADE AND LATIN AMERICA'S SHARE (1978)

	Japan's export		Japan's import	
	Thousand ton	Billion ton-mile	Thousand ton	Billion ton-mile
Total	72 600	356	566 400	3 148
Percentage	(5.3)	(9.5)	(6.8)	(12.7)
Bulk cargo	48 200	241	268 300	1 526
Percentage	(5.8)	(10.1)	(13.8)	(25.4)
General cargo	24 400	115	23 200	131
Percentage	(4.3)	(8.3)	(4.4)	(7.7)
Oil			274 900	1 491
Percentage			(-)	(-)

Source: Ministry of Transport, *NIHON KAIUN NO GENJYO* (The White Paper on Japan's Maritime Transport) 1979.

Note: (1) ( ) indicate Latin America's shares.

(2) Bulk cargo includes among exports steel, fertilizer, cement automobile, and among imports iron ore, coal, timber, grain, sugar, animal feed, soya beans, pulp, phosphate, salt, scrap, non-ferrous metals, cali-salt, chips and pig iron.

figures were 12.7%, 25.4% and 7.7% respectively. Imports of bulk cargo from Latin America account for one quarter of the total from all over the world (see table 4).

With respect to the condition of trade with the five Andean countries and Brazil which are the subject of this study, the total value of exports from Japan to the Andean countries in 1978 was US$ 907.5 million (13.8% of all exports to Latin America) and the value for Brazil was US$ 1 252.5 million (19.2% of the total). The total value of Japanese imports was US$ 797.4 million for the Andean countries (26.2%) and US$ 786.9 million (25.8%) for Brazil. Exports to Brazil are 1.4 times higher, and imports therefrom are about the same as those for the five Andean countries as a whole. Consequently, the Japanese trade surplus was US$ 110 million with regard to the Andean countries and US$ 465.5 million with Brazil. Among the changes in the items exported to and imported from both areas (value basis), exports from Japan are mainly heavy and chemical industry products in both categories, while raw materials and foodstuffs constitute a large percentage of imports to Japan. In 1978, imports from the Andean countries consisted of 54% raw materials and 17% foodstuffs, and those from Brazil were 64% and 21% respectively, the percentages being higher in the case of Brazil. A high percentage of these raw materials were textile materials, and most of the foodstuffs were meat and fish. However, when the trade statistics for 1978 are compared with those for 1969, ten years previously, structural changes can be observed, although they are very gradual. The share of exports of light industrial products from Japan to Latin America

decreased, while the share of exports of processed goods (industrial products) from Latin America to Japan increased. The export of light industrial products from Japan sharply decreased from 18% in 1969 to 6% in 1978, but the share of heavy and chemical industry products during the same period rose from 80% to 92%. The main items in this increase were metal products and machinery. However, the share of imports of processed goods (industrial products)

Table 5

JAPAN: TRADE WITH LATIN AMERICA, 1969

(Thousands of dollars)

	Latin America		
	Total	Andean[a]	Brazil
		Export	
Foods	12 664	347	260
Percentage	1.34	0.24	0.22
Fuels	2 993	1 040	843
Percentage	0.32	0.72	0.70
Light industrial goods	170 833	26 119	9 047
Percentage	18.10	18.11	7.50
Heavy and chemical goods	754 000	116 582	108 931
Percentage	79.88	80.82	90.37
Others	3 460	160	1 460
Percentage	0.36	0.11	1.21
Total	943 949	144 247	120 541
Percentage	100.00	100.00	100.00
		Import	
Foods	327 884	67 478	36 230
Percentage	28.21	14.06	24.43
Fuels	633 791	305 902	92 847
Percentage	54.52	63.74	62.61
Light industrial goods	35 140	413	0
Percentage	3.02	0.08	0.00
Heavy and chemical goods	156 876	104 460	15 029
Percentage	13.50	21.77	10.14
Others	8 751	1 670	4 177
Percentage	0.75	0.35	2.82
Total	1 162 442	479 922	148 283
Percentage	100.00	100.00	100.00

Source: MITI.

[a] Includes Bolivia, Chile, Colombia, Ecuador and Peru.

Table 6

JAPAN: TRADE WITH LATIN AMERICA, 1978

(Thousands of dollars)

	Latin America		
	Total	Andean[a]	Brazil
		Export	
Foods	39 511	749	503
Percentage	0.60	0.08	0.04
Fuels	51 449	29 851	5 426
Percentage	0.78	3.29	0.43
Light industrial goods	396 745	84 993	39 597
Percentage	5.99	9.37	3.16
Heavy and chemical goods	6 108 950	788 720	1 202 133
Percentage	92.27	86.91	95.97
Other	23 985	3 154	4 879
Percentage	0.36	0.35	0.39
Total	**6 620 641**	**907 467**	**1 252 538**
Percentage	100.00	100.00	100.00
		Import	
Foods	988 818	136 366	161 550
Percentage	32.45	17.10	20.53
Fuels	1 371 472	427 397	500 779
Percentage	45.01	53.59	63.63
Light industrial goods	47 295	7	26
Percentage	1.55	-	0.003
Heavy and chemical goods	583 362	232 349	122 799
Percentage	19.14	29.14	15.60
Other	56 366	1 333	1 840
Percentage	1.85	0.17	0.23
Total	**3 047 313**	**797 452**	**786 994**
Percentage	100.00	100.00	100.00

Source: MITI

[a]Includes Bolivia, Chile, Colombia, Ecuador and Peru.

increased from 13.5% in 1969 to 19% in 1978. Among imports from the Andean countries, the share of processed goods increased over the same period from 22 to 29%, while that for Brazil increased from 10 to 15.6%. Table 5 and 6; the types of total exports and imports for both areas are given in section B-3; for goods which may be containerized refer to section C-3.

From the above discussion, we can summarize the characteristics of maritime transport between Japan and Latin America as follows: 1) there are major differences in the types of goods exported and imported (from table 4, 2.97 million tons of bulk cargo were exported from Japan to Latin America, while 37.0 million tons, or about 13.2 times that amount were imported by Japan from Latin America); 2) in the case of general cargo, the amounts of imports and exports are about the same; 3) because of the long distance from Japan, the transport figures are about double on a ton-mile basis.

2. Institutional conditions

a) *The liner market*

The liner market between Japan and the Andean countries is characterized by the almost complete monopoly exercised by conference vessels. Among the conference routes from Japan to Latin America shown in table 7, those operating toward the Andean countries are the Japan/West Coast South

Table 7

FREIGHT CONFERENCE IN JAPAN/LATIN AMERICA ROUTE

	Number of conference members			
	Japan	Latin America	Others	Total
A. Japan/Latin America Route				
Japan/Puerto Rico and Virgin Islands Freight Conference	5	-	1	6
Japan/Latin America Eastbound Freight Conference	5	3	2	10
Japan/Mexico Freight Conference	5(1)	2(1)	2(1)	9(3)
Japan/West Coast South America Freight Conference	4(1)	6	1(1)	11(2)
Brazil/Far East/Brazil Freight Conference	2	3	1	6
Far East/River Plate/Far East Freight Conference	2	4	1	7
Total	**24(2)**	**17(1)**	**10(2)**	**51(5)**
B. Latin America/Japan Route				
West Coast South America/ Far East Freight Conference	3	5	-	8
Brazil/Far East/Brazil Freight Conference	2	3	1	6
Far East/River Plate/Far East Freight Conference	2	4	1	7
Total	**7**	**11**	**2**	**20**

Note: ( ) indicates associate members.

America Freight Conference and the Japan/Latin America Eastbound Freight Conference. The former consists of 11 shipping companies linking Japan with Bolivia, Colombia, Ecuador, Peru and Chile. The companies include five from Latin America (one each from Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela), five Japanese companies and one each from England and Holland. The main ports of call in the Andean countries are Buenaventura (Colombia), Guayaquil (Ecuador), Callao (Peru), and Valparaíso (Chile), though they differ depending on the companies. The latter conference links Japan and Korea and the countries of Central America, Panama, the Caribbean and the West Indies. Cargoes are transhipped to Mexico and the Andean countries.

As regards the voyage from the Andean countries to Japan, the West Coast South America/Japan Freight Conference corresponds to the above-mentioned conference. Conference vessels have a monopoly of almost all items. This conference connects Colombia, Ecuador, Peru and Chile, and Japan, South Korea and Hong Kong. It consists of three South American shipping companies (Chile, Colombia, Ecuador and Peru) and three Japanese companies.

The Brazil/Far East/Brazil Freight Conference covers journeys in both directions between Japan and Brazil. This conference covers Rio de Janeiro and Santos in Brazil, and Yokohama and other ports in Japan. It consists of three South American companies (two from Brazil and one from Argentina), two Japanese companies and one other company.

Latin American shipping companies are important members of these conferences and the monopolistic position of the conference companies is protected against non-conference ships by law which ensures stabilized rate levels.[113] These conferences have both formal and informal arrangements concerning transport shares and shipping rates and there are various types of combinations from the use of a pooling system to general arrangements.

b) ***The tramp market***

Bulk materials such as iron ore, coal and grain are carried by specialized cargo vessels belonging to outsiders for which special contracts are made with the shippers. This tramp service is important because of its considerable volume as shown in table 4.

In the tramp market, liper-type multi-purpose vessels are used in accordance with market conditions. Such ships, whose use is increasing, are intended to rationalize maritime transport because of the differences in the types of goods on the outward and homeward voyages in trade between the developed and developing countries. They can simultaneously handle general cargo consisting mainly of industrial products suitable for the liner market and bulk materials consisting mainly of primary products on the outward and homeward voyages.[114] Liper-type vessels can deal with different types of cargo because of their special design which will be described later.

3. Maritime transport technology

From the technological point of view, the liners used on the outward voyages are grouped with conventional-type vessels although many of them are multi-purpose vessels. For example, the ships on the liner routes between Japan and

the west coast of South America and Brazil generally have facilities for containers and frozen goods, tanks for liquid cargo and the capacity to carry heavy cargo (of more than 50 tons). Tramp vessels on the outward voyage are usually special ships for automobiles or ships which can carry heavy plant cargo. Even though the number of containers handled by conventional-type ships is increasing rapidly, the container ships are all of the semi-container type and there are no full container ships in service. There are no LASH or RO/RO ships or special ships to carry wood.

The liners used on the homeward voyage are mainly conventional-type ships which return to Japan after making the outward voyage. Since iron ore, grain and other bulk materials which are imported in very large quantities by Japan are transported by large-scale special cargo ships, there is a surplus of homeward-bound liners. Iron ore is currently carried by 55 thousand—160 thousand DWT ore carriers, or by 90 thousand—260 thousand ton O/O vessels (for both iron ore and oil), and 155 thousand—165 thousand ton O/B/O vessels (for iron ore/bulk materials and oil), and thus bulk freight is reduced by triangular transport with oil.

The technical characteristics of the liper-type multi-purpose vessels involve decks suitable for general cargo, steel products and machinery, and the hold is convertible so as to handle grain in accordance with the demand for transport of primary products. Many of these vessels have removable decks for automobiles.

We shall now examine the imbalance in the goods imported and exported between the Andean countries and Brazil and its impact on the technology of maritime transport. Because of the lack of specific statistics on Japan and the area under investigation, the general structural trends of each type in total exports and imports in the region will be observed. As regards the types of goods imported and exported in this area, there is in general a major imbalance between imports and exports, with particular wide-ranging differences in goods from one country to the rest, especially in the case of the Andean countries. For example, in the case of the volume of solid bulk exports as a percentage of the total exports of each country, the figures were 74% for Chile, 88.3% for Peru and 87.4% for Brazil in 1977 (see table 8). In the case of Brazil, most of this was iron ore, with some soya beans, maize and sugar. In the case of Chile, the main material was iron ore, but the other materials were copper concentrate and saltpeter. In Peru, iron and copper concentrate were the main bulk exports. In the case of imports, the percentages of liquid bulk materials (oil and oil products) imported were 57% for Chile, 55% for Peru and 72% for Brazil in 1977. This imbalance between imports and exports results in inefficient use of ships because of differences in stowage factors due to the different types of materials. It also considerably hinders the efficient use of port facilities and causes an increase in maritime transport costs.

However, if general cargoes alone are considered, 3 920 thousand tons were exported and 3 850 thousand tons imported in 1977 in four Andean countries, i.e., almost equal amounts. This is one important factor when considering future containerization (containerization is described later).

The position of Latin American maritime transport in the world and the problems it faces have already been described in section A. In this section the

Table 8

COMMODITY STRUCTURES OF TRADES

(Thousands of tons)

	1976		1977		1978	
	Export	Import	Export	Import	Export	Import
			Chile			
General cargo	2 251.7	658.7	2 374.4	833.8	2 984.9	1 217.6
Bulk cargo (solid)	10 017.3	1 522.0	9 062.3	1 484.7	7 199.4	2 002.5
Bulk cargo (liquid)	112.1	3 286.3	555.7	150.23	486.2	3 292.9
Refrigerated cargo	157.7	45.4	246.3	62.8	285.5	64.7
Total	**12 538.8**	**5 512.4**	**12 238.7**	**5 531.5**	**10 956.0**	**6 577.7**
			Colombia			
General cargo	935.2	1 811.4	393.8	916.7	866.1	1 582.5
Bulk cargo (solid)	848.0	663.3	130.7	974.7	228.4	650.1
Bulk cargo (liquid)	1 152.0	563.9	-	1 858.6	119.7	390.4
Total	**2 935.2**	**3 038.6**	**524.5**	**3 750.0**	**1 214.2**	**2 623.0**
			Ecuador			
General cargo	242.3	798.7	210.9	1 260.6	280.1	1 094.7
Bulk cargo (solid)	28.6	438.8	92.5	868.5	64.9	617.1
Bulk cargo (liquid)	8 811.1	1 234.0	6 912.2	842.3	6 750.2	375.0
Refrigerated cargo	1 242.4	35.0	1 286.3	51.8	1 420.0	37.2
Total	**10 324.4**	**2 506.5**	**8 501.9**	**3 023.2**	**8 515.2**	**2 124.0**
			Peru			
General cargo	1 272.9	1 156.0	938.9	841.9		
Bulk cargo (solid)	6 235.8	1 224.4	8 370.8	1 393.9	...	...
Bulk cargo (liquid)	726.7	1 850.2	574.5	2 722.4		
Total	**8 235.4**	**4 230.6**	**9 884.2**	**4 958.2**	**10 115.9**	**2 425.7**
			Brazil			
General cargo	5 023.1	4 439.8	5 629.5	3 866.5	6 300	3 600
Bulk cargo (solid)	76 884.4	12 104.1	66 791.9	13 460.2	75 000	16 000
Bulk cargo (liquid)	4 472.8	4 827.0	3 321.7	45 134.1	3 100	46 500
Refrigerated cargo	416.4	42.5	411.0	62.5	600	100
Containerized cargo	190.5	218.1	256.3	258.1	400	300
Total	**86 987.2**	**58 631.5**	**76 410.4**	**62 781.4**	**85 400**	**66 500**

Source: Tomás Sepúlveda-Whittle, *International Maritime Transport in South America* (E/CEPAL/R.213, Rev.13), December 1979.

Table 9

MERCHANT MARINES BY TRADES AND TYPES OF VESSEL AT 1 JANUARY 1979

	Units	GRT[a]	DWT[a]	Cargo capacity (100 m³)				TEU[a]	Average age
				Dry	Refrig-erated	Liquid	Total		
Andean area[b]									
Conventional freighter	60	426	591	1 919	160	467	2 546	160	15.6
Rapid freighter	18	228	240	348	53	19	420	3 447	5.8
Multi-purpose freighter	10	96	158	217	-	-	217	2 404	6.2
Refrigerated ship	5	39	38	-	52	-	52	1 072	10.2
Bulk carrier	14	245	405	522	-	4	526	-	7.1
Ore/oil carrier	3	121	243	-	-	273	273	-	6.3
Oil tanker	3	64	111	-	-	140	140	-	3.7
Total	114	1 223	1 794	3 016	267	903	4 186	7 083	9.6
Brazil									
Conventional freighter	10	202	268	389	12	13	414	1 490	11.5
Rapid freighter	28	295	351	557	61	25	646	5 206	7.7
Multi-purpose freighter	22	210	327	421	14	-	460	1 430	4.4
Refrigerated ship	4	22	24	-	34	-	34	-	7.0
Bulk carrier	15	315	530	641	-	-	641	676	5.1
Ore/oil carrier	10	754	1 404	-	-	1 679	1 679	-	4.1
Oil tanker	1	129	283	-	-	339	339	-	5.0
VLCC	7	591	1 147	-	-	1 386	1 386	-	5.0
Total	117	2 518	4 335	2 008	121	3 470	5 599	8 802	5.6

Source: Tomás Sepúlveda-Whittle, *International Maritime Transport in South America* (E/CEPAL/R.213, Rev.13), December 1979.
[a] Thousands of tons. [b] Includes all vessels above 1 000 GRT in Bolivia, Chile, Colombia, Ecuador and Peru.

current state of maritime transport in the Andean countries and Brazil will be discussed from the standpoint of the ships currently owned. As of January 1, 1979, the Andean countries had 114 and Brazil 117 ocean-going ships, which is about the same, but when tonnage is compared, the Andean countries possessed 1 794 thousand tons, while the figure for Brazil was 4 335 thousand tons which is about 2.4 times more. Clearly Brazil has larger ships. The average age of these ships is 9.6 years in the Andean countries, ranging from 3.7 years for tankers to 15.6 years for general cargo ships. The general cargo ships in particular tend to be getting older. In Brazil, the average age of the general cargo ships is 11.5 years, which is less than in the Andean countries. The average age of ships is 5.6 years.

Of the various types of ships, the multi-purpose ships owned by the Andean countries accounts for 158 thousand DWT, 8.8% of the total, while in Brazil, they represent twice the Andean figure with 327 thousand DWT, but this constitutes only 7.5% of the total DWT. However, in the TEU conversion of multi-purpose ships, Brazil has 1 430 units and the Andean countries 2 404 units, 1.68 times the Brazilian figure. The overall TEUs are 8 802 for Brazil and 7 083 for the Andean countries which is quite similar. Brazil has a high percentage of iron ore/oil ships (1 404 thousand DWT) and VLCC (1 147 thousand DWT). These two types of ships account for 58.8% of the total DWT (see table 9).

C. TRENDS IN TECHNICAL AND INSTITUTIONAL INNOVATIONS

1. General prospects and selection of suitable types of ships

To determine the general prospects, it is first necessary to look at the future trends in trade between Japan and the Andean countries and Brazil. However, since accurate forecasts are difficult to make, the following rough assumptions can be made as to the future, on the basis of past experience (B-1 and tables 5 and 6): 1) imports of bulk materials from South America will continue to increase. Among these materials, there will be increases in iron ore from Brazil,[115] and grain (soya beans, maize and sorghum) from Brazil and Argentina; 2) in the case of materials with specific shapes, there will be increases in exports of wood and chips from Ecuador, Chile and other countries; and a decrease in the export of automobiles from Japan to the Andean countries; 3) because of the tendency for increases in exports of industrial products to Japan especially from the Andean countries and Brazil, the share will continue to increase in the future under conditions of increasing future competitiveness. Latin America's share of general cargo is shown in table 4. The levels are still low, 4.3% (1 050 thousand tons) of the exports from Japan and 4.4% (1 020 thousand tons) of the imports, which is almost balanced.

If a long-term viewpoint, taking account of these charges, is adopted in selecting ships in the future, the following types of ships will provide the most efficient means of ensuring satisfactory and adequate maritime cargo

movement. On the outward voyage from Japan to South America: 1) car-carriers for automobiles and steel; 2) ships to carry heavy cargo such as plant (in this case, conventional type ships with heavy derricks can be used); and 3) full container ships for cargo which can be containerized. On the homeward journey from South America to Japan: 1) large-scale combined cargo ships or special bulk carriers for bulk materials such as iron ore and grain; 2) special wood-carrying ships and special cargo ships for chips for materials with a particular shape such as wood and chips; and 3) full container ships for other general cargoes which can be containerized. However, this list gives the ideal type of ship which should be introduced from a long-term standpoint. Since a large amount of fixed investment including land-related investment is required in such cases, it is probably more effective at the present stage to make a decision based on short- to medium-term maritime cargo movements. (Case studies are introduced below concerning prospects for the introduction of combined iron ore and grain carriers from Brazil to Japan and the introduction of full container ships on the route between the Andean countries and Japan.) On the route between Japan and the Andean countries in particular, conventional type multi-purpose vessels would probably be the most efficient in handling the small volume and highly diversified cargoes. Since such ships can handle both bulk materials and general cargo, they should contribute to improving the participation ratio which is required in Latin American countries. Such vessels as the previously mentioned liper-type satisfy such aims, although conventional type vessels with container hatches, derricks for heavy cargo, etc., can also meet such requirements.

The use of RO/RO vessels, a type of multi-purpose vessel which can handle such cargoes as bulk materials, automobiles, containers and steel, is considered as one step towards the introduction of container ships. Conventional vessels are loaded and unloaded by means of cranes or derricks on ships when docked at piers, but RO/RO vessels can be loaded and unloaded directly by vehicles from the piers. Consequently, such ships would contribute to the elimination of port congestion which is very serious in South American countries. RO/RO vessels are much more efficient than conventional multi-purpose vessels in the handling of containers. However, the introduction of RO/RO vessels involves conversion of "cargo handling systems" and various preparations such as provision of the related facilities are necessary.

2. Selection of ships for bulk cargo[116]

The aim here is to reduce the transport cost of basic commodities, especially iron ore and grain, from South America (mainly Brazil) to specified ports in the Pacific region of Asia.

To decide on the best type of ship and service, studies were centered on the realization of cost-down by 1) utilizing bigger sizes of ships, and 2) minimizing the ballast-ratio. Four types of ships, the 22, 65, 127 and 250 types (22 000 DWT, 65 000 DWT, 127 000 DWT, and 250 000 DWT, respectively), were picked up for rate calculation models. As a result, it was found that the most efficient transport would be a combination of a full load of grain or, in some cases, a

mixture of grain and iron ore for 1-2 ports in a 120-130 type ship from Brazil, returning to Brazil with Australian coal. In such cases, the transport costs between Brazil and Japan would be about 30% less than those between the United States and Japan, while the costs between Brazil and Southeast Asia are about the same as those between the United States and Southeast Asia. When grain is transported from Brazil in a 250 type ship, it was clear that combination transport of iron ore and grain from Brazil and returning to Brazil with crude oil is necessary rather than being based on a direct return service. However, it must be pointed out that stable conditions on the supply side such as the promotion of export corridor programmes and the establishment of export systems, are extremely important in conjunction with the more efficient maritime transport mentioned above.

3. Prospects for containerization

a) *Prerequisites for containerization*

Containerization not only requires a huge investment in containers, ships and port facilities, but also involves a massive investment in related land transport facilities to establish an integrated system with land transport. There are also many problems including the disposal of conventional vessels made redundant by the introduction of container vessels, the surplus manpower resulting from savings in labour in ports and on ships, and other related problems. However, the spread of containerization in the routes between Japan and Latin America is essential from a long-term standpoint and it is necessary to establish conditions to cope with these problems.

Almost all of the routes between Japan and the developed countries are already containerized. Table 10 shows the years such services started and the operating conditions.

Australia has similar trade patterns to those of Latin America, but full container vessels were already operating there in 1969.[117] The annual number of containers handled on the Australia-Japan route in 1969 was 65 thousand (TEU), but since then there has been a 73% increase to 110 thousand. With the revolution in container ships which occurred during this period, the ANL Company introduced a RO/RO vessel with a 1 241 container capacity in 1975 and the Flinders Co. a large hybrid vessel in the same year. In 1977, a container ship with a 1 648 container capacity was put into services by AJCL.

In comparison, containerization has been greatly delayed in Latin America. As was described in section A-2, no countries in South America, with the exception of the Carribbean region, had any full container or LASH vessels and there were only two RO/RO ships on January 1, 1979. Multi-purpose vessels which can handle containers represented only 10.1% of ocean-going vessels on a DWT basis.

However, according to a joint ECLAC-OAS study performed in May 1979, the ideas of the South American countries concerning utilization have changed considerably over the last 10 years. They are well aware of the items involved and the utilization of containers is increasing.[118] Ports in every country are beng equipped to handle containers. For example, a container terminal is under

Table 10

PROGRESS OF CONTAINERIZATION OF THE ROUTES FROM JAPAN (MARCH 1978)

Containerized routes	Year of inauguration	Days required	No. of companies	No. of vessels	Gross tonnage	No. of containers		Average types of vessels	
						TEU	Percentage	GT	No. of containers
Canadian route	Aug. 1968	30	6	12	254	11 053	19.5	21 181	921
U.S.A.-North Pacific route	May. 1970	30	6	6	140	5 979	10.5	23 254	997
New York route	Aug. 1972	50	5	8	296	14 250	25.2	37 052	1 781
European route	Dec. 1971	60	3	8	404	15 382	27.2	50 558	1 923
Mediterranean route	Sep. 1974	75	2	2	61	2 815	5.0	30 350	1 408
Australian route	Oct. 1969	30	4	5	89	4 411	7.8	17 867	882
West Australian route	Feb. 1978	30	3	2	8	720	1.3	3 975	360
New Zealand route	Oct. 1976	39	2	1	32	1 258	2.2	31 672	1 258
Nakhodka route	Sep. 1975	10	2	2	10	745	1.3	5 182	373
Total				**46**	**1 294**	**56 613**	**100.0**	**28 130**	**1 231**

Source: Ministry of Transport, White Paper on Japan's Maritime Transport, 1978.

Table 11

ESTIMATE OF CONTAINERIZABLE GOODS IN THE ROUTE JAPAN-ANDEAN COUTRIES

	Japan's export		Japan's import	
	Thousands of tons	TEU	Thousands of tons	TEU
1970	106 102	7 093	96 178	5 948
1972	107 933	6 738	66 132	4 176
1974	115 634	7 544	90 590	5 579
1975	173 525	10 830	60 703	3 723
Average	**125 799**	**8 025**	**64 726**	**4 856**

Source: Tomás Sepúlveda-Whittle, Maritime Aspects of Trade Between Japan and Latina America, 1978, and ECLAC, Minuta sobre Reunión con el Prof. Akio Hosono del 22 de noviembre de 1979.

construction in the port of Santos in Brazil and will soon be ready for service. There is also equipment and sufficient space for container handling in Buenaventura Port in Colombia. A special terminal for containers is also under construction in Guayaquil in Ecuador.

Sepúlveda-Whittle has estimated the cargo which can be containerized as a prerequisite for the introduction of full container vessels on the routes between Japan and the Andean countries (see table 11). According to this estimate, exports suitable for containerization from Japan rose 70%, from 100 thousand tons in 1970 to 170 thousand tons in 1975, while imports to Japan increased from 40 to 60 thousand tons over the same period, showing little change. However, if goods which could not be handled with conventional container transport can be containerized as container techniques advance, the amount of containerized cargo should increase in the future.

The main problem involving containerization in the Andean countries is that, in comparison with Australia where containerization was completed at an early stage, each country desires to possess a port for full container vessels because of its official maritime transport policies and its national shipping companies. The problem of the increased ratio of participation which is stressed in the Andean countries may have a reverse effect on containerization. Shipping companies in the Andean countries do not at present possess the sufficient technical experience to operate full container vessels and at the time of containerization, techniques such as container inventory control and terminal operation are needed. For Latin American shipping companies, the lack of financial resources to introduce full container ships will also be important.

At present, the most up-to-date conventional vessels which were already alloted to the leading routes in Europe and North America prior to containerization are still active on Latin American routes, and the Latin American shipping companies are still at the stage of expanding their fleets of

multi-purpose vessels. When containerization occurs, the problem of handling these ships will also arise. The fact that the market for conventional vessels is cheap is another factor hindering containerization. Recently, container rules have been studied with the purpose of placing them under conference rules as a result of insistent demands by shippers, but little progress seems to have been made.

b) ***Prospects for containerization***

Under these conditions, it does not appear that services by full container vessels will start in the next few years, but it cannot be denied that containerization is a trend of the times.[119] One means of offsetting the insufficient technical and financial resources of the Andean countries and introducing a unified container system is to use a joint assignment system for container ships such as that used between Japan and Australia. The container system for the Andean region should cope with the various small countries to minimize costs. The following example has already been adopted on the routes between Japan and Australia and Japan and Southeast Asia. (However, in practice Sepúlveda-Whittle points out that this will be extremely difficult in the case of the Andean countries):[120]

1) Technically, several small countries form one unit so that there are not separate port facilities for full container ships in each country. The number of ports is as small as possible and each of these should be provided with the most modern equipment possible and managed efficiently.

2) Some sort of optimum combined usage is sought between expensive full container ships which can transport large amounts rapidly, and inexpensive small feeder ships. With this method, the full container ships are shuttled back and forth between the main ports in Japan and ports in the above-mentioned countries where investment has been centred on the construction of large container terminals, and the feeder ships travel the coastal routes or between the ports in the countries. Since the feeder service will be made to the ports with backward facilities, the most suitable ships would be those with a shallow draft and container cranes or RO/RO ships.

Since containerization of ships is only one part of an integrated container transport system including land transport, it is also necessary to establish the land-based infrastructure. Feeder services need not be limited to ships, but road and rail transport by trailers should be studied to find out the best methods. Thus, the optimum distribution for an integrated transport system from the sites of production to those of consumption will be determined.

D. PROSPECTS FOR CO-OPERATION IN MARITIME TRANSPORT

1. Prerequisites for co-operation

Before investigating a co-operation system, it is necessary to clarify the basic attitudes of Japan and Latin America towards co-operation.

1) The Latin American countries stress the development of their own systems of maritime transport. The reason is that 90% of all goods transported in the region depend on maritime transport, and Latin American countries recognize that the development of maritime transport is indispensable for the progress of economic co-operation both among Latin American countries and with other regions. As has often been stressed at UNCTAD meetings, Latin America, as a group of developing countries, should consider improving the efficiency of cargo handling by the ships of each country, solving the problems of international balances by increasing freight income through increased participation as shipowners and operators, together with related effects such as fostering the shipbuilding industry and efforts directed towards the land-related sectors such as bridges, steel structures, and construction and industrial machinery. In expanding the nation's merchant fleet, the political aims of enhancing national prestige and guaranteeing economic security cannot be overlooked. However, this report is mainly dedicated to economic analysis. In this respect, one argument holds that ships with the latest technology are required for political aims. In this report, the selection of ships and co-operation are mainly examined from the standpoint of transport economy.

2) When considering the possibility of co-operation with Japan, it is essential to start from the current state of the Japanese shipping and shipbuilding industries. In 1978, the Shipping and Shipbuilding Rationalization Council, an advisory organ of the Ministry of Transport, prepared a report which stated that the Japanese shipping industry was then undergoing a period of structural changes where it was necessary to change from the former "offensive shipping" to "defensive shipping". It was indicated that Japanese ships had to regain international competitiveness, and, mainly because of the sharp increase in Japanese personnel costs, it was necessary to establish systems together with the ships of foreign countries, especially tie-in ships. The 1978 Maritime Transport White Paper (*Current Conditions of Japanese Maritime Transport*, edited by the Shipping Bureau, Ministry of Transport) indicated that Japanese shipping was rapidly losing international competitiveness and short-term assistance measures were necessary to achieve recovery. From the long-term viewpoint, rationalization of total costs and especially personnel costs, would be required; high technical levels such as in the electronics industry would have to be introduced into the shipping industry, and conversion to a technologically-intensive system industry was advocated.

3) Concerning the promotion of co-operation in shipping between Japan and Latin America, it is also necessary to consider that Japan has a favourable balance of trade as indicated in section B-1.

We shall now direct our attention to major topics. The types of ships required by the Andean countries and Brazil were indicated in the studies in the previous section. Consequently, our concern here will be the way in which Japanese co-operation may help transform the Andean countries and Brazil into shipowners and operators.

1) The first point to investigate is these countries capacity to cope with the problems involved in becoming shipowners and operators, using their own industrial (technical) and financial resources. The following two points are important in evaluating such capacities. The first is that these countries must be divided into two groups, i.e., Brazil which is a newly industrialized country with experience in building large ships and is in the third group of shipbuilding countries, and the Andean countries which have almost no such experience. The second point is that it is necessary to review the results of co-operation carried out by Japan in the past and based on this experience, identify those fields in which co-operation should be carried out and those in which another approach should be adopted.
2) Shipbuilding technology consists of design (basic and detailed) and production techniques. Generally speaking, shipbuilding is an integrated assembly industry using medium-level techniques and is within the reach of Latin America if the development of related industries has reached a certain stage.[121] ISHIBRAS in Brazil is a good example of a successful shipbuilding joint venture. In addition, it is necessary to possess testing capacity using software technology to select the most efficient performance for the ship.
3) In the case of shipping, one example of a joint venture to foster shipping in a backward area is that between the Kawasaki Line of Japan and the FLOPEC Company of Ecuador for the operation of tankers. However, in this case, the joint venture was dissolved at the request of Ecuador five years after it was established and was changed into a technical co-operation agreement. This indicates that co-operation in the shipping field would be better suited to technical co-operation agreements rather than joint ventures. The Kawasaki Line is also providing the CPV company of Peru with highly appreciated advice on liner services at the captain level.
4) In addition, at the government level, requests are increasing not only for technical co-operation through such means as the dispatch of shipping experts, but also for economic co-operation in the form of loans for the purchase of ships to foster national merchant fleets. In October 1978, a highly interesting shipping seminar was held at the request of the ESCAP countries with those in charge of shipping policies and management in attendance.

2. Fields and methods of co-operation

With these considerations in mind, the following appear to be the fields and methods in which Japan can co-operate in shipping and shipbuilding in Latin America in the future (especially the Andean countries and Brazil):

1) In the field of *shipping*: i) it will be necessary to hold seminars on shipping, inviting those responsible for shipping policies and management in the Latin American countries (this can be limited to the Andean countries), and specialists from such organizations as those in the United Nations, ECLAC and LAFTA (themes can include shipping management, shipbuilding, crew education and port facilities), as well as for Japanese specialists to attend such seminars held in Latin America. Such exchange of information is a first step to mutual understanding; ii) group and individual training should be performed in Japan to educate shipping specialists in the Andean countries;[122] iii) joint research between Japan and Brazil will be required to investigate in greater detail the possibilities of large-scale combined shipments of iron ore, grain and other cargoes between the two countries; iv) in the Andean countries, integrated surveys of maritime cargo movements such as a joint study with ECLAC should be considered to prepare the selection of suitable ships for the region and for containerization; v) on a private basis technical co-operation agreements are considered as suitable forms of co-operation.

2) In the case of *shipbuilding:* i) the conventional policy is to provide government loans and technical co-operation as well as group and individual training to educate shipbuilding specialists in the Andean countries; ii) it will also be necessary to provide educational assistance to individuals and institutions such as various types of local technical schools to meet the technical needs in these countries; iii) on a private basis, joint ventures in the Andean countries at both the ship design and production stages for the construction of ships such as conventional and multi-purpose vessels can be considered.

3) With respect to *containerization*, co-operation from Japan in both the software and hardware fields can be considered, but this is sometimes impossible to perform simultaneously, and a stepwise approach such as the following is necessary:

First Stage (Preparatory Stage)

1) This is the stage of expanding current tie-ups between Latin American and Japanese shipping companies, advancing from the current policies on national shipping to increase co-operation and prepare for joint services with full container ships.

2) A consensus must be formed concerning concepts related to maritime transport in the Latin American countries and Japan. To achieve this, efforts must be made to find the means of establishing a satisfactory common understanding of current conditions (by comparison with other regions), problem areas and the possibilities of improvement.

Second Stage (Transition Stage)

1) Conventional ships will gradually be replaced by RO/RO and container ships. Items which can only be handled by conventional ships such as heavy plant will be transported by conventional ships.

2) There will be a gradual increase of feeder ships, ports and institutional innovations.

Third Stage (Final Stage)

1) A new co-operation system will be established using full container ships, large-scale container terminals, etc. Japan will provide co-operation at all stages as follows:

a) With respect to hardware, construction of container terminals in the main ports and provision of the means for continuous transport from these terminals to the feeder service ports and from these ports to the final destinations.

b) With respect to software, greater emphasis should be laid on this area than hitherto and there will be a close exchange of information via an exchange of technicians. Personnel will be trained as container terminal operators in connection with the container ship services and as container inventory controllers (general know-how for the efficient utilization of containers).

3. Co-operation in related infrastructure sectors

If cargo handling efficiency in the ports is not improved, the ships will have to stay longer in the ports, the annual operating rates will fall and profitability will decrease. Therefore, co-operation over improvements in such fields as port planning for various purposes, port facilities, cargo handling machines, packing techniques (especially for the export of industrial products) and container repairing must be considered in relation to co-operation concerning ships and services.

Transport routes from local production sites to the harbours must be provided and it is also important to reduce land transport costs. In this field, Japan should upgrade its co-operation in the future with respect to such projects as export corridor programmes and integrated transport systems.

Notes

[1] All the original data for this statistical statement are derived from World Bank, *World Development Report* (1979), Annex; as are those for all statistical descriptions hereafter including the figures, unless specified otherwise.

[2] For details of Japan's experience in this respect, see Ohkawa and Rosovsky, *Japanese Economic Growth* (Stanford University Press, 1973), in particular chapter 9.

[3]Including direct investments.

[4]Enterprises with 251 persons or more.

[5]Enterprises with 51 to 250 persons.

[6]Enterprises with 6 to 50 persons.

[7]See for example Inter-American Development Bank and Export-Import Bank of Japan, *Latin America/Japan Business Cooperation Symposium* (Proceedings) (1979) and Akio Hosono, "Trade and financial relations be ween Latin America and Japan: Prospects and possible lines of action", *Latin America in the International Economy*, Víctor Urquidi and Rosemary Throp, eds. (London, Macmillan, 1973).

[8]See ECLAC, *International Co-operation for Industrial Development in Latin America* (E/CEPAL/CONF.69/L.3) (Santiago, Chile, 1979), p. 102 and ECLAC, *Economic and Social Development and the External Economic Relations of Latin America* (E/CEPAL/1061) (Santiago, Chile, February 1979).

[9]ECLAC, *The Economic and Social Development and External Relations of Latin America* (Santiago, Chile, 1977); Gérard Fichet and Norberto González, "The production structure and dynamics of development", *CEPAL Review*, Second Semester 1976 (United Nations Publication, Sales No.: E.77.II.G.2); Ian Little, Tibor Scitovsky and Maurice Scott, *Industry and Trade in Some Developing Countries: A Comparative Study* (OECD, 1970); Balassa, Bela and collaborators, *The Structure of Protection in Developing Countries* (Baltimore, Johns Hopkins University Press, 1971); Balassa, Bela, *Development Strategies in Semi-industrial Countries* (IBRD, 1969); V. Carbo and P. Meller, *Sustitución de Importaciones, Promoción de Exportaciones y Empleo: El Caso Chileno* (Santiago, Chile, CIEPLAN, 1977).

[10]ECLAC, *Economic and Social Development ...*

[11]ECLAC, *ibid.*

[12]According to the definition of the industrial census of Mexico, 1975. This includes certain repair activities. Data for 1965 and 1970 have been adjusted to this definition. The labour force absorbed by this activity amounted to 189 900 persons in 1970, corresponding to 20.1% of the above-mentioned figure for cottage industry. In other words, those who engaged in certain repair activities constitute 8.1% of the total labour force in manufacturing industry according to the above-mentioned definition. See Norberto García, "Microindustrias en el sector manufacturero de México" (Santiago, Chile, PREALC, 1978), page 8 and methodological appendix and PREALC, *Diferenciales de Remuneraciones y Coexistencia de Establecimientos de Distinto Tamaño: México 1965-1975* (Santiago, Chile, 1978) p. 1.

[13]See appendix tables at the end of chapter 1.

[14]International Labour Office, *Towards Full Employment: A Programme for Colombia* (Geneva, 1970). It is worthwhile noting that the projection made by this study for 1985 assumes that this percentage of employment in handicraft manufacturing in the total labour force of manufacturing industry would remain unchanged.

[15]Víctor Tokman, "Informal-formal sector interrelationships", *CEPAL Review*, first half of 1978 (United Nations Publication, Sales No.: E.78.II.G.3).

[16]E.V.K. Fitzgerard, *The State and Economic Development: Peru since 1968* (Cambridge, 1976).

[17]These percentages are the difference between the number of persons occupied by enterprises of 4 persons or over registered by the Industrial Censuses of the Ministry of International Trade and Industry and the number of persons covered by the Labour Force Survey of the Prime Minister's Office. It should be noted that the percentage of cottage industries' labour force just before World War Two was 32.0% (1940). See "Industrial development and the traditional small-scale industry" (mimeo).

[18]Rodolfo Haro and Gunilla Ryd, *El papel de la pequeña y mediana industria en el proceso de industrialización de Colombia* (December 1979), draft.

[19]In this study it is assumed that a prime condition for coexistence of both SSE (represented by suffix 1) and LSE (represented by suffix 2) is a state of equal return on capital, from which we get

$$\frac{\pi_1}{\pi_2} = \frac{Y_1 - w_1 L_1}{K_1} \Big/ \frac{Y_2 - w_2 L_2}{K_2} = 1 \qquad (1)$$

where π indicates the rate of return on capital, Y stands for output, w, L and K represent wage rate, labour force and capital respectively.

From equation (1)

$$\frac{z_1 (1 - \beta_1)}{z_2 (1 - \beta_2)} = 1 \qquad (2)$$

where β indicates relative share of labour $\left(= \frac{wL}{Y} \right)$ and z stands for Y/K.

Equation (2) is satisfied when:

(case 1) $z_1 > z_2$ and $\beta_1 > \beta_2$.
(case 2) $z_1 = z_2$ and $\beta_1 = \beta_2$.
(case 3) $z_1 < z_2$ and $\beta_1 < \beta_2$.

In case 1, SSE is defined to be relatively labour-intensive from $\beta_1 > \beta_2$ and if case 1 is satisfied we get $\frac{w_1}{w_2} > \frac{Y_1}{Y_2} > \frac{K_1}{K_2}$ where $y = Y/L$ and $k = K/L$; similarly

$\frac{w_1}{w_2} = \frac{Y_1}{Y_2} = \frac{k_1}{k_2}$ for case 2 and $\frac{w_1}{w_2} < \frac{Y_1}{y_2} < \frac{k_1}{k_2}$ for case 3.

From this, the case of postwar Japan satisfies the requirements of case 1 and it can be said that cases 1, 2 and 3 identified above are prerequisites for the coexistence of SSE with LSE.

[20] See Kazushi Ohkawa and Mutsuo Tajima, *Small-medium Scale Manufacturing Industry: A Comparative Study of Japan and Developing Countries* (International Development Center of Japan, 1976). Mutsuo Tajima, *Small-medium Scale Manufacturing Industry: Further Discussion in a Comparative Study of Japan and Developing Nations* (International Development Center of Japan, March 1978).

[21] PREALC, *Diferenciales de remuneraciones...*

[22] Rodolfo Haro and Gunilla Ryd, *Notas sobre el desarrollo, la política industrial y las condiciones de coexistencia de la pequeña, mediana y gran industria en Perú, 1963-1973* (1980), draft.

[23] Rodolfo Haro and Gunilla Ryd, *Nota sobre los rasgos del desarrollo industrial de Costa Rica (1960-1975) y las condiciones de coexistencia de la pequeña, mediana y gran industria en 1974* (1979), draft.

[24] Haro and Ryd, *El papel de ...*

[25] PREALC, *op.cit. Diferenciales de remuneraciones ...*

[26] *Ibid.*

[27] Haro and Ryd, *El papel de ...*

[28] Akio Hosono, "Industrial development and employment", *CEPAL Review*, Second semester 1976 (United Nations Publication, Sales No.: E.77.II.G.2).

[29] The following study is highly relevant to this feature: K. Ohkawa and S. Motai, *Small-medium Scale Manufacturing Industry: Further Notes on Japan's Case* (International Development Center of Japan, September 1978).

[30] Group II consists of textile products; apparel and other finished products made from fabrics or similar materials; leather and leather products.

[31] Group I consists of food and kindred products; lumber and wood products; ceramics, stone and clay products; printing, publishing and allied industries; miscellaneous industries.

[32] Carlos Eduardo Do Nascimento Gonçalves, *A Pequeña e Média Empresa na Estrutura Industrial Brasileira* (Campinas, 1976).

[33] Sample survey made by the Instituto Mexicano de Comercio Exterior (IMCE), cited by ECLAC "La exportación de manufacturas en México y la política de promoción", *Políticas de promoción de exportaciones* (E/CEPAL/1046/Add.6) (Santiago, Chile, 1979), pp. 78-81.

[34] Estimation made by ECLAC, on the basis of information from IMCE and the Consejo Nacional de Ciencia y Tecnología (CONACYT), ECLAC, *ibid.*, p. 82.

[35] CACEX, *Relatório Anual*, 1971 and 1974.

[36] IPEA/INPES, *Relatório de Pesquisa*, No. 29, p. 72.

[37] Héctor García, *La política de desarrollo de las exportaciones de manufacturas en Brasil* (Santiago, Chile, ECLAC, 1976), p. 32.

[38] *Ibid.*, Appendix.

[39] *Ibid.*, p. 32.

[40] Priority sectors are also identified in the Plan, including among others capital goods producing sectors, food-processing sectors, etc.

[41] Nacional Financiera, *Programa de apoyo integral a la industria pequeña y mediana* (Mexico D.F., 1978).

[42] IBGE (Instituto Brasileiro de Geografía e Estatistica), *Relatório do Grupo de Trabalho sobre o Programa Especial de Apoio a Pequena e Média Empresa Nacional* (Rio de Janeiro, 1977).

[43] SUDENE (Superintendence for Development of Northeast Region) has been carrying out the Programme of Assistance for Small and Medium Eneterprises in the Northeast Region. See, Robalinho de Barros, Frederico J.O. and Rui Lyrio Modevesi, *Pequenas e Médias Industrias* (Rio de Janeiro, 1973).

[44] Small- and Medium-sized Enterprises Agency (MITI), *White Paper on Small and Medium-sized Enterprises, 1977* (Tokyo, 1977).

[45] Small and Medium-sized Enterprises Agency, *White Paper on Small- and Medium-sized Enterprises, 1978* (Tokyo, 1978).

[46] *Ibid.*

[47] INTERBRAS, *Relatório de actividades 1977* (Rio de Janeiro, 1978). Regarding trading companies in Brazil, we have referred to unpublished information from JETRO.

[48] ECLAC, "Export promotion in Japan and its application to Latin America", *Economic Bulletin for Latin America*, Vol. XV, No. 1. First half of 1970 (United Nations Publication, Sales No.: E.70.II.G.6) and ECLAC, "Empresas de comercialización integrada del Japón", *Comercio Exterior* (Mexico, 1970).

[49] With regard to "consorcios" see ECLAC, *La exportación de manufacturas y la política de promoción* (Santiago, Chile, 1976).

[50] It is reported that large enterprises frequently complain about the low quality of products supplied by subcontractors as well as delivery delays affecting subcontracted products. (PREALC, *Análisis sobre el proceso de subcontratación en el sector línea blanca en Chile* (Santiago, Chile, September 1978.)) Complaints of foreign automobile industries operating in Latin America about the quality of parts and components produced by local subcontractors are well known.

[51] ECLAC, *Social and Economic Development and External Relations of Latin America* (Santiago, Chile, 1977) p. 183.

[52] *Ibid.*, p. 85.

[53] An important observation regarding this point was made by an expert mission sent to Venezuela to co-operate with its government in promoting small- and medium-sized enterprises: the level of technology of such processes which are typically adequate for small- and medium-sized industries such as forging and casting of iron and steel was found to be less advanced. JICA, "Report on the Mission for Study on Preparation of the Plan for Promotion of Small and Medium Enterprises in Venezuela" (in Japanese), 1978.

[54] PREALC, *Análisis sobre el proceso* ..., p. 8.

[55] ECLAC, "Small scale industry in the development of Latin America", *Economic Bulletin for Latin America*, Vol. XII, No. 1 (1967) (United Nations Publication, Sales No.: E.67.II.G.7), p. 82.

[56] A nation-wide campaign was organized to introduce standard norms and quality control and voluntary groups known as Quality Control Circles (*QC* Circles) were organized, with the participation of large numbers of workers.

[57] In Ueno and Kinoshita [11], the manufacturing sector is subdivided into two subsectors: the textile industry and heavy industry.

[58] The author is greatly indebted to Professors Kazushi Ohkawa and Shokichi Motai for their permission to use material published in Ohkawa and Motai [7].

[59] For investment functions endogenous variables only affect other endogenous variables with a time lag, and ordinary least squares are used to estimate these equations.

[60] As for indigenous manufacturing goods, the short-run income elasticity of imports is simply 0.2899, while the long-run elasticity is $0.2899/(1 - 0.7290) = 1.070$.

[61] Much of the background information in this section on Latin American iron ore mining was furnished by the study *Ferrominería en América Latina* prepared for the present study by Eng. Fernando Aguirre Tupper.

[62] For the development of iron ore mines in Australia, see for example, R.B. McKern, *Multinational Enterprise and Natural Resources* (Sydney, McGraw-Hill Book Company Australia, 1976), chapter 4.

[63] The relationship between the Federal government and the Western Australian State government in matters of iron mine development is analysed in detail in Garth Stevenson, *Mineral Resources and Australian Federalism* (Canberra, Australian National University, 1976).

[64] Government of Western Australia, Department of Development and Decentralisation, *The Pilbara: A Development Concept* (1973).

[65] An interesting account of the MBR is given by Raymond F. Mikesell, "Iron ore in Brazil: the experience of the Hanna Mining Company"; *Foreign Investment in the Petroleum and Mineral Industries: Case Studies of Investor-Host Country Relations*, Raymond F. Mikesell and others (Baltimore, Johns Hopkins University Press, 1971), pp. 345-364.

[66] *Iron ore Manual, 1979* (Tokyo, TEX Report, 1979), pp. 65-66.

[67] *Ibid.*, pp. 237-239.

[68] Cf. "Interim report of the preliminary study on the regional development of the Carajas Corridor" (provisional) (International Development Center of Japan, December 1979).

[69] Most of what are called captive mines nowadays really are joint ventures with local capital. See, for example, *Iron Ore Manual, 1979*, p. 32.

[70] This implies that, in addition to comparison of private costs and private benefits, social costs and benefits in iron mine development and ore exports are to be considered from the standpoint of their contribution to the economic development of the host countries.

[71] See M. Radetzki, "Where should developing countries' mineral be processed? The country view versus the multinational company view", *World Development*, Vol. 5, No. 4 (1977).

[72] In 1979 the FOB price of fine ores (Fe 64%) of the CVRD destined to Europe was 23.9 cents per Fe unit on average, while the price of oxide pellets was 40.23 cents per Fe unit (see *Iron Ore Manual, 1979*, pp. 24-25).

[73] Mt. Klahoya (Ivory Coast), Putu (Liberia) and Klukwan (Canada) are examples of iron ore pelletizing projects for the moment suspended in which development Japan was asked to participate in the 1970s.

[74] Japan's Kawasaki Steel constructed a sintering plant on the Mindanao Island of the Philippines (5 million tons of output capacity per annum with 700 local employees) in 1977. It uses iron ore principally from Brazil and Australia and transports its products about 1 500 sea miles away to Japan by three specially-designed sintered ore carriers. See *Iron Ore Manual, 1979*, pp. 87-88.

[75] For example, Australia's rich iron ore reserves are found in the Northwest of the continent, while its population is concentrated in the Southeast.

[76] For details, see Yasuhiko Torii, *An Analysis of the Investment Effects of an Integrated Steel Plant in a Developing Country: The Case of the Malayawata Steel* (in Japanese) (Tokyo, Association for Promotion of International Co-operation, 1978).

[77] See, for example, Industrial Development Institute of Minas Gerais, *Economic Information on Minas Gerais, Brazil* (1977).

[78] See "Interim report of the preliminary study on the regional development of the Carajas Corridor".

[79] See *The Pilbara: A Development* ...

[80] The above discussion is based on observations by the authors after visits to these two mines.

[81] See Sueo Sekiguchi, *Japanese Direct Foreign Investment* (London & Basingstoke, Macmillan Press, 1979), chapter 2.

[82] For the Asian Port scheme, see International Development Center of Japan, *A Plan for 'Asian Port' (Tentative Scheme)* (November 1979) and chapter VI of the present volume.

[83] Terutomo Ozawa maintained that this scheme represented Japan's new resource diplomacy of the 1970s by calling it "government-backed group investment". But as discussed in section B, the collective ore purchase arrangements with the backing of government finance started in the 1950s with the Kiriburu iron mine project in India. Thus, the collaboration of the Japanese Government and the private sector in resources procurement has a long history. Cf. Terutomo Ozawa, "Japan's new resource diplomacy: government-backed group investment", *Journal of World Trade Law* (January-February 1980).

[84] International Development Center of Japan, "Possibility of development of oil bearing crops in Brazil, Malaysia and Nigeria", *Mikai Hatsu Chiiki Norin Shigen Kaihatsu Sogo Kiso Chosa* (Basic Survey on Development of Agriculture and Forestry Resources) (Tokyo, 1975), pp. 128-131.

[85] International Development Center of Japan, "Mexico and Pakistan", *Mikai Hatsu Chiiki Norin Shigen Kaihatsu Sogo Kiso Chosa* (Basic Survey on Development of Agriculture and Forestry Resources) (Tokyo, 1977), pp. 132-133.

[86] Fondo de Cultura Económica, "Funciones de Consumo y Coeficientes de Elasticidad Ingreso", *La Distribución del Ingreso en México*, Series VII, Mexico D.F., 1968.

[87] Ministry of Agriculture and Forestry, *Shokuryo Jukyu no Chôkimitôshi* (Long-term Projection of Demand and Supply for Food) (Tokyo, 1975).

[88] FAO, *Commodity Projections for 1985*. It includes commodities such as cereals, wheat, coarse grains, rice, oilseeds, fats and oil and meats, mimeo (Rome, June 1978).

[89] IBGE (Instituto Brasileiro de Geografia e Estatistica), *Sinopse Preliminar do Censo Agropecuario. V. 14, Brasil, Censos Económicos de 1975* (Rio de Janeiro, 1978).

[90] INEC (Instituto Nacional de Estadística y Censos), *Agricultural Census*, 1974.

[91] Quoted from Secretaría General del Consejo Nacional de Planificación Económica, "Diagnóstico del sector agrícola, 1950-1977", mimeo (Guatemala, December 1978).

[92] John H. Sanders, *et al., New Technology and Small Farms: some Experience with Beans and Cassava* (CIAT, Revised, 1979), p. 8.

[93] John H. Sanders & John K. Lynam, "New technology production and small farmers: some experience with beans and cassava" (Revised June 1979), p. 2 and tables in Annex, mimeo.

[94] Data provided by Ministry of Agriculture and Livestock, Mexico.

[95] Data and explanations obtained from experts of IICA, CATIE and CIAT when the present author visited them in 1979 were used to analyse the new strategy. John H. Sanders, *et al., op.cit.*, pp. 9-13 was also consulted.

[96] This point is also mentioned in "Chile: antecedentes de la explotación familiar", the report prepared by TERRA Institute.

[97] Dirección General de Estadística, *Agricultura 1935/1936 Censo* (Santiago, Chile, 1938), pp. 13-27.

[98] United Nations, *Proyecciones macroeconómicas para América Latina en el decenio de 1970* (E/CN.12/865/Rev.1), New York, 1972, p. 147.

[99] Instituto de Economía Agrícola, *Modernization of Agriculture in the State of São Paulo* (Secretaría de Agricultura, Governo do Estado de São Paulo, 1973), p. 267.

[100] Since our analysis is based on data for the 1950s and the 1960s, its framework may not be the best to diagnose the situation in the 1970s. According to ECLAC officials, the situations in Latin America in the 1970s improved significantly in favour of small farmers.

[101] G. Edward Schuh, "The exchange rate and U.S. agriculture", *American Journal of Agricultural Economics*, Vol. 56 (February 1974), pp. 1-13.

[102] Agricultural family workers usually reside in areas some distance from non-agricultural employment. Also they have a great deal of highly specialized knowledge and skill which is of little value in other industries. Thus potential off-farm wages must be substantially discounted by the costs of moving and commuting, and in view of the lack of skills which the off-farm employment opportunities require. For this reason, neither family nor hired workers in agriculture will move out, except very young ones and can be regarded as fixed assets in agriculture.

[103] See more detailed discussions in A.G. Muller and R.A. Hinton, "Farmers' production costs for corn and soybeans by unit size", *American Journal of Agricultural Economics*, Vol. 57 (December 1975), pp. 934-939 and Instituto de Economía Agrícola, *Prognóstico 73/74* (Secretaría da Agricultura, Governo do Estado de São Paulo, São Paulo, 1973), p. 3.

[104] ECLAC, *Situation and Evolution of Food and Agriculture in Latin America* (E/CEPAL/1017) (Santiago, Chile, June 9, 1976).

[105] Tomás Sepúlveda-Whittle, *Maritime Aspects of Trade Between Japan and the West Coast of South America* (March 1978), draft.

[106] ECLAC, *Facetas económicas e institucionales de las nuevas tecnologías de transporte en América Latina* (Santiago, Chile, September 1974).

[107] Regional groupings of Latin American countries by UNCTAD is as follows:

Code	9.	Developing countries and territories in America
	9.1	Caribbean and North America
	9.2	Central America
	9.3	South America: northern seaboard
	9.4	South America: western seaboard
	9.5	South America: eastern seaboard

[108] At present, a project for the containerization of the route between these ports and North-West Europe is in the planning stage. A container terminal is under construction in Ecuador.

[109] The Caribbean area is attended by the CAROL containerized service from North-West Europe.

[110] Container terminals are under construction in Brazil and Uruguay.

[111] Tomás Sepúlveda-Whittle, *International Maritime Transport in South America* (E/CEPAL/R.213/Rev.13) (Santiago, Chile, December 1979).

[112] *Manual of Shipping Documents for Latin American Ports* (prepared by the OAS/ECLA Transportation Program, 15 April 1980).

[113] However, Sepúlveda-Whittle pointed out that the constant rise in liner rates adversely affected Latin American countries. T. Sepúlveda-Whittle, *International Maritime Transport ...*

[114] The liper-type vessels are so-called "standardized ships" of about 15 000-30 000 DWT. The examples are SD14 of England and "F" series of IHI. These vessels are generally registered in Liberia, Panama and other tax havens and employ Greek, Taiwanese, Indian, Philippine and other cheap labour for their crew. They are extremely competitive in the charter market. Liner companies in the developed countries will charter a liper, advise the name and schedule of the vessel to the shipper and also handle the pick-up, loading, ocean transport and unloading under their own name. The liner companies issue their own B/L's as well. From the shippers point of view, everything is handled in exactly the same manner as in the case of a shipment by the liner companies' own vessels. The liper vessel will be chartered off by liner companies at the port of destination after the completion of unloading. The owner of the vessel will then find another charterer in the charter market and in most cases the vessel will return to the developed country as a transport by carrying such items as sugar and ore. In this case, a vessel which departed from a Japanese port does not necessarily return to Japan, but often travels to other countries.

[115] Long-term contracts of Japan to import iron ores from South American countries are as follows:

(as of 1979, Unit: 1 000 tons)

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Brazil	39 890	35 490	35 490	35 590	35 590	35 590	35 590	27 240	27 240
Peru	1 875	2 100	2 000	-	-	-	-	-	-
Chile	7 800	3 500	3 500	3 500	3 500	3 500	3 500	1 575	-
World	132 710	113 100	111 465	104 090	96 540	93 640	86 940	71 865	63 190

Source: Annual report on iron ores, 1979.

[116]This is the essence of a study done by the International Development Center of Japan (IDCJ) in 1979. The author of this chapter participated in this study.

[117]However, we should not overlook the fact that there are important differences in port labour costs between Latin American and Australian ports, since Latin America comprises separate countries each with national tendencies that are much more potent than the equivalent tendencies in the various Australian States, etc.

[118]Sepúlveda-Whittle, *International Maritime Transport ...*

[119]Carlos Aragón, *The Development of a National Line and the Effects on its Country's Economy and Transportation System* (October 1978) and interviews with him.

[120]Sepúlveda-Whittle pointed out that in the case of Andean countries, full-containerization would progress in the form of "ore port in ore country". In this case, the ports of Valparaíso, Callao, Guayaquil, Buenaventura, Arica or Antofagasta (for Bolivia) would be selected mainly from present port conditions and geopolitical reasons.

[121]Related industries required for shipbuilding are, for example, the metal industry which provides steel plates, angles, etc., industry providing fittings such as bulbs, pipes, etc., engines and castings such as helm, stern frames, etc. A pre-requisite of shipbuilding is a certain level of development of the above-mentioned industries.

[122]UNCTAD is currently planning an educational programme, known as TRAINMAR, for application in Latin America which could cover some of the same ground as the training programmes discussed in this section.

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