

TOWARDS NEW FORMS OF
ECONOMIC COOPERATION
BETWEEN LATIN AMERICA AND JAPAN

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P R E F A C E

For more than a quarter of 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 concerning both sides. The mere continuation of past trends, however, may not guarantee the achievement of desirable objectives for the future on 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 cooperation 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 cooperative activities. Diversification of economic relations in terms of both countries (or regions) and products seems also one of the important policy objectives of Latin America, which is attempting to reshape the region's economy in a form more open to the international market.

On the one hand, the new forms of cooperation should be sought in the light of correct recognition of what Latin American countries aim at 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 arrived at and their rich natural resource endowments - have to be kept in mind. On the other hand, Japan's capability of cooperation 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 urgent to be able to count on diversified and assured supplies of natural resources.

We do not wish to emphasize merely 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 expectations for the promotion of economic cooperation 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 intended to cover superficially all aspects of the problem before us. The IDCJ is a private, nonprofit 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 Gonzalez, Deputy Executive Secretary, CEPAL, and Prof. Kazushi Ohkawa, Research and Training Director, IDCJ.

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F O R E W O R D

Among the possible research areas in the general framework suggested in the study objective mentioned in the Preface, the major ones selected are specifically such areas as manufacturing and trade, mining, food and agriculture, and ocean transportation, rather than all the problem areas at issue. The choice has been carefully made after intensive discussions between both sides. The technological innovation and institutional organization improvements have been assumed as the most important and appropriate aspects which are more or less common to all the research areas mentioned above. This is, so to speak, the working hypothesis agreed upon at the outset of the study, in the sense that these innovations and improvements could appropriately be implemented in order to meet requirements arising in connection with the building-up of a new style of Latin American development in most of the important sectors of the economy and Japan's cooperation in this area could be most effective in the light of historical experience and the accumulated knowledge derived from this. This does not mean, however, the entire exclusion of important relevant aspects other than technological and institutional problems. The related aspects have also been analysed when necessary.

Because of area confinements and the hypothesis setting, a number of important aspects and problems have been left almost untouched, the most important, among others, being capital, financing and investment and the related fields. We hope that these will be studied in future. However, we are pleased to be able to say that 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 Cooperation of Japan with Latin America," IDCJ, 1978 and "New Development Strategy for Latin America and Possibilities of Japan's Cooperation," IDCJ, 1979, with the final achievements made during the last year of our Project.

It is made up of Parts I and II. Chapters 1 and 2 of Part I are intended to summarize all research results of individual chapters in Part II, with the purpose of presenting the problem situation in general and particular relevant areas focussing on the newly industrializing process of Latin American countries (Chapter 1) and of recommending ways of promoting new forms of economic cooperation 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 cooperation received from Prof. Akio Hosono in preparing the draft of Part I, in particular, Chapter 2. However, we are responsible for these two chapters of Part I. The individual chapters of Part II written by the team members* of the project, in collaboration with CEPAL staff,** are also the result of our joint studies, but the authors of these chapters bear responsibility for them.

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PART I

CHAPTER 1 ASPECTS OF THE NEWLY INDUSTRIALIZING PROCESS IN LATIN AMERICAN COUNTRIES: AN OVERALL VIEW

INTRODUCTION

Industrialization cannot be viewed as equivalent to modern economic growth or socio-economic 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 various sectors of the economy has long been the problem of development strategy. Moreover, the appropriate pattern, speed and role of industrialization may differ considerably among nations because of the 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. For the Latin American countries there is no doubt that this basic recognition is valid. It has thus been our consensus that the newly industrializing process of Latin American countries must be the aspect on which our research should be focussed in order to provide overall 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, such focus of aspects presented in this chapter does not necessarily imply that other aspects are of minor importance. As will be touched upon below, the Latin American countries appear to have a wide range of variance in terms of development phases, the size of countries, the degree of natural resources endowment, etc. These historical and typological differences among individual countries within the region are important and should not be ignored, in particular in searching for new forms of economic cooperation 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 be the followers of the latter in the near future. In addition, Japan's experience can be examined efficiently 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 cooperation of Latin American countries with Japan.

At the outset, three aspects of a conceptual and methodological nature need to be explained in view of the reasons stated above: first, regarding the so-called NICs, or newly industrialized countries, second, regarding Japanese historical experience in terms of development phases, and third, regarding analytical comparison with Asian countries. The recent emergence of NICs has brought forth a new problem in the shape of the trade in manufactured goods, often calling for rearrangement 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 have become at issue. The problem has often been viewed as being the result of specific industrial trade policies adopted by NICs in a rather short-term context. The effects of some "specifics" cannot be denied. It is our view, however, that the phenomenon should rather be understood as a "natural" concomitant 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 adequate 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 facts which characterize the SICs. In recent years (1970-1977), their average annual rate of growth has been 6.5% far greater than 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 vs. DCs no longer seems appropriate for discussing the world-wide 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 W.W.I. it arrived at the phase of semi-industrialization. Due to certain historical events, in particular W.W.II., this phase was prolonged to 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 reflection is the important 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 to see why there should be any exception for the Latin American countries with respect to such a long-term historical progression of industrialization phases, although a number of countries of 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 comparative analysis with Asia, and particularly the East Asian countries, will often be made. We believe this is desirable and useful for two reasons: first, it is useful for making clear both the common and different characteristics of industrialization broadly found between 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 the Latin American side.

I. PATTERNS OF OVERALL GROWTH AND INDUSTRIALIZATION IN LATIN AMERICA

During the past quarter of a century, Latin America, taken as a whole, shows an impressive rate of economic growth despite its very high rate of population increase: 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's experience in the largely comparable development phase (1.8% in 1887-1919, 2.1% in 1919-1938), which is one of the highest recorded by the presently 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 natural resource endowments between the two regions.

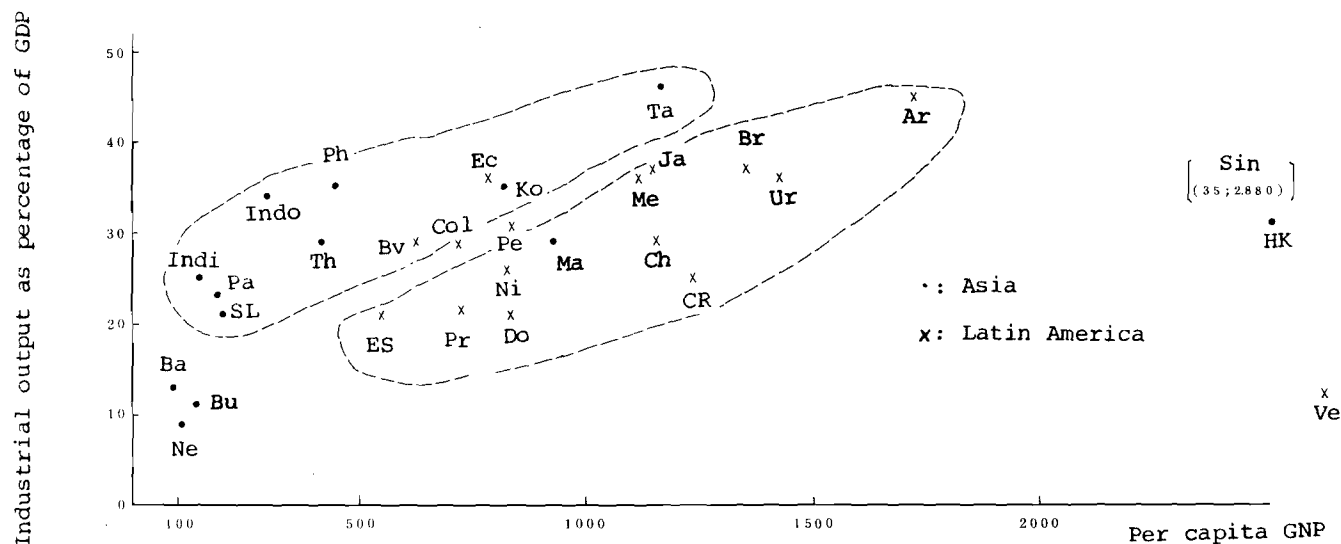
As the last aspect is important for the discussion that follows, Figure 1 is presented in order to clarify the relationship between the

1 All the original data for making this statistical statement are derived from World Bank, World Development Reports, 1979, Annex; the same for all statistical descriptions hereafter including the Figures, unless specified otherwise.

rate of industrialization (indicated by the percentage share of manufacturing in the GDP) and the income level (indicated by per capita GNP in U.S. 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 is to be observed only separately among the countries of 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.

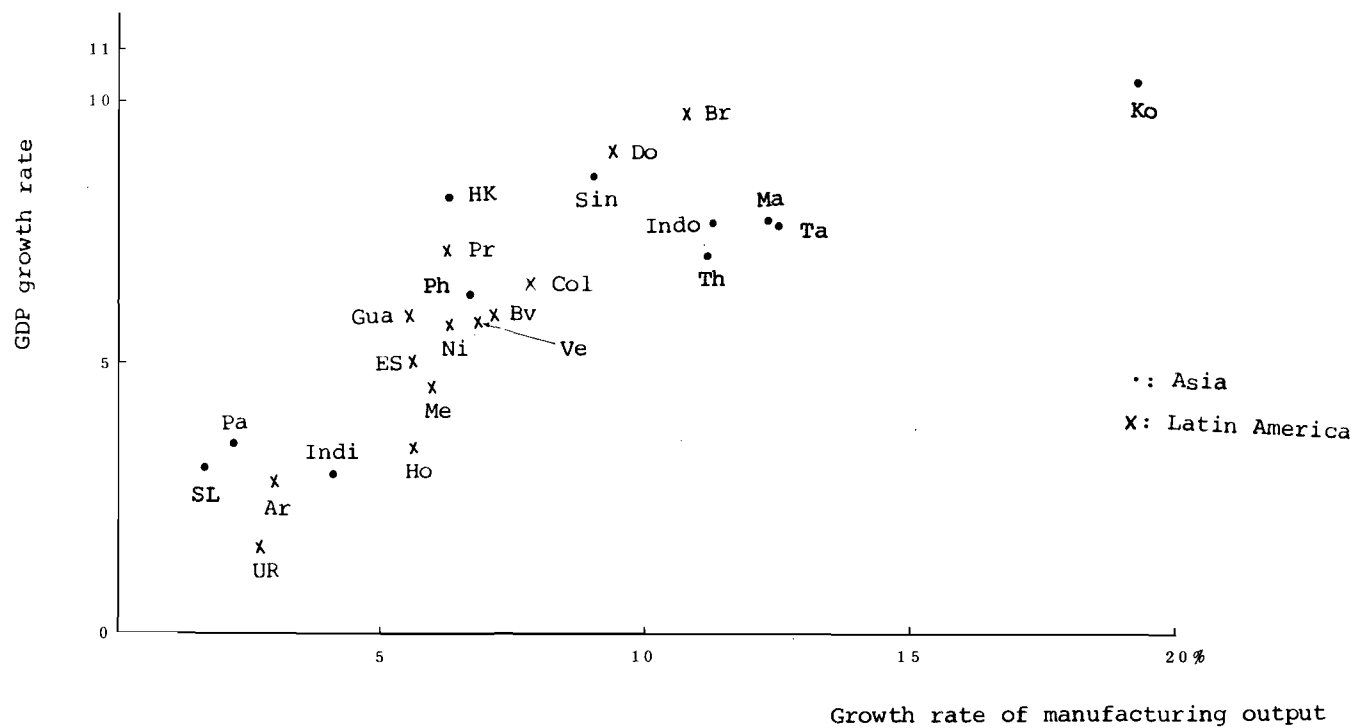
The story turns out differently when we look at the growth pattern. Between the rates of industrial growth, as measured by manufacturing output, and those of overall growth, as measured by GDP, a fairly close association is found for the countries as a whole, almost irrespective of whether they are in Latin America or Asia (Figure 2). This implies two points which are worthwhile noting: first, with respect to the growth performance, common characteristics can be seen in the role played by industrialization broadly, despite the differences of income level and industrial structure presently arrived at by countries and the region averages, and second, in Latin America in particular, the dynamism of industrialization on recent decades varies a great deal among 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. Actually, 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 of the region has changed a great deal, however, during a quarter century of postwar industrialization, due to the varied degrees of dynamism in the countries.

Figure 1 Latin American and Asian Countries: Relation Between Share of Manufacturing in GDP and Per Capita Income Levels, 1977



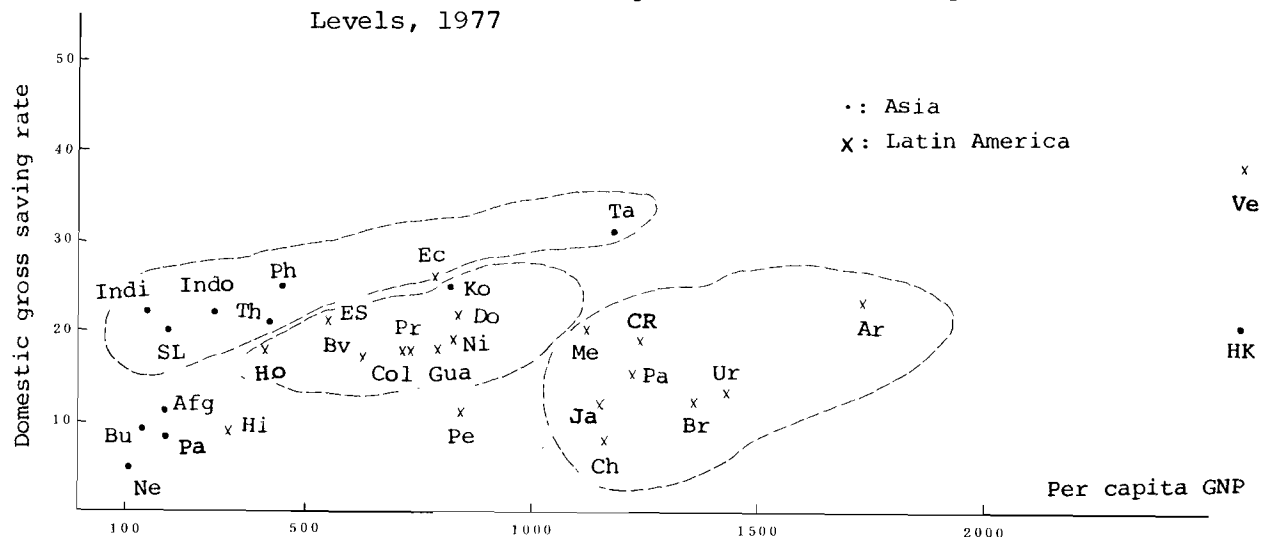
Afg	Afghanistan	Gua	Guatemala	Ni	Nicaragua
Ar	Argentina	Hi	Haiti	Pa	Pakistan
Ba	Bangladesh	HK	Hong Kong	Pe	Peru
Br	Brazil	Ho	Honduras	Ph	Philippines
Bu	Burma	Indi	India	Pr	Paraguay
Bv	Bolivia	Indo	Indonesia	Sin	Singapore
Ch	Chile	Ja	Jamaica	SL	Sri Lanka
Col	Colombia	Ko	Korea	Ta	Taiwan
CR	Costa Rica	Ma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

Figure 2 Latin American and Asian Countries: Relation Between Growth Rates of Manufacturing Output and Growth Rates of GDP, 1970-1977



Several features of economic growth and industrialization may be observed in addition to the output production performance discussed above. Two of these are taken up 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 meet the expectations which might be drawn 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 as compared to Asian countries, and this difference appears to be especially marked in the comparisons between SICs in the two regions.

Figure 3 Latin American and Asian Countries: Relation Between Gross Domestic Savings Ratios and Per Capita Income Levels, 1977



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 prevailed in this region may not be the factor which is relevant to shaping the growth pattern and identifying development phases. Thus, we have to pay attention rather 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 greatly 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" is clearly identified for the latter in the shape of a sharp sudden increase in the investment ratio, particularly in the case of Republic of Korea, while this is not distinctly identified for the former, although their investment ratio vis-a-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 vs. 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 behavior 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 touched upon 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 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 these percentages were 25 for Argentina, 27 for Brazil, 30 for Uruguay and 50 for Mexico, but was 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 did increase in these countries at a considerable pace in the past 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 of 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 to the point. In this regard, it may be noted that even in the smaller Latin American countries, their degree of export dependence tend to be comparatively high compared with the general international tendency.

This fact is worthy of even more attention when it is recalled that in Latin America the present SICs are of large size, while in Asia they are of smaller size, 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 improving fast her position, but in Latin America just the reverse is taking place. Explanation of this fact is beyond our capability, but this is an important point when characterizing the semi-industrialized countries, particularly as regards their role in regional development.

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

1. 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 objective of socio-economic 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 as 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 there, both historical and typological, are different from other regions.

The solutions of 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 newly industrializing 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 CEPAL documents. First, the strategy of promoting further industrialization as a dynamic force for accelerating economic growth has its own requirements, which are proper to 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 final consumption 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 richer resources 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 that possible favorable "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 cooperation can be implemented efficiently 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 socio-economic 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. Let us discuss several major aspects of them at issue below.

2. It is our view that attainment of improvements in overall industrial efficiency must be one of the key elements of the entire requirements 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 can be consistent with the well-known thesis of "infant industries" in the sense that a level of efficiency lower than international standards can be acceptable if the difference is reasonable in level and length of time.

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 as compared with the forerunners. This is the basic reason why the industrial growth of contemporary SICs has been much faster than the prewar figures. 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 considerations, is the most important item for fulfilling the necessary conditions for realizing 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 has been assumed in the statement above. This is derived from analyzing Japan's historical experience. In brief, it can be stated that technological innovation in the

latecomer countries, for which possibility of technological transfer from advanced countries is crucial, need specific carriers for implementing this process and that this can efficiently be accomplished when the functions of the carriers, namely the institutional-organizational set-ups in the latecomer's nations, can operate adequately to meet such requirements. The organization of industrial production; the relations between large scale industries and medium-small industries being included; 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 relevant to 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 share also 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 discuss later new forms of economic cooperation between Latin America and Japan.

To deal more specifically with technological progress at the semi-industrialized phase, let us now discuss the level and type of technologies required for promoting 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

2 For details of Japan's experience in this regard, see Ohkawa and Rosovsky, Japanese Economic Growth, Stanford University Press, 1973, in particular Chapter 9.

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 vs. labour-intensive type. This is because they 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 intended by this term, however, can more or less be represented by what we call "engineering industries," although these also include consumer durables production. These industries produce machinery and metal products by 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 presumption that a shift from the traditional to modern industries would involve always a distinct rise in the capital-labour ratio. (iii) An even more important distinction which should be made between, say, 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 preceding 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 the labour productivity but also the capital productivity should be taken into account, particularly in view of the fact that capital is scarce while labour is still abundant at 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 for smaller sizes (except very small sizes), while it is lower for larger sizes. When considering the appropriate type and efficiency of technology, this fact should be taken into account more seriously in the context of the close relationship between technological progress and institutional and organizational improvement, mentioned above.

3. 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 know 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 evaluate properly 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 favorable to increasing employment. We cannot deny

the validity of this, but at the same time it should be said that often seems to be more influential a greater rate of industrial growth.

The reason may be illustrated by the following example. It is a common view held 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 the like 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 of export promoting countries vs. 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 at issue is to clarify the doubt 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 vs. capital-intensive?

The doubt cannot be solved without having reliable data on the capital-labour ratio and its change over time, and this is not possible to have 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, $\eta = GL/GY$, 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 it is our speculative view 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. Relatively sizeable effects 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 some efforts to examine the performance of the crude elasticity of the industrial sector by comparing Latin American and Asian countries so far as these data are available. 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):

							(%)
	GL	Gy	GL/Gy		GL	Gy	GL/Gy
Asia:				Latin America			
(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 can be useful only for a very broad judgment, yet they appear very suggestive in showing 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 accompany an increase in employment at least about half its pace, and that this quantitative association cannot be expected to change to the detriment of employment increases in the process of making a shift from the phase of initial industrial growth to the semi-industrialized phase, which undoubtedly implies an acceleration of the rate of productivity increase. 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 these operate in an interacting 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 proposition about the positive association between output-productivity increase and employment increase can broadly be stated without making any serious qualifications, and that policies aimed at accelerating the rate of industrial growth, and hence of overall improvement in industrial efficiency, are of the highest priority.

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

1. 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 angle for analyzing 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 seems sometimes to tend to criticize the trade performance of a number of Latin American countries as less progressive: 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 vs. labour-intensive) it is all the more inappropriate, in our view, for seeing the real trade problems of Latin American countries.

Many countries of the region are now very conscious about 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 intentions to proceed to such import substitution has officially been pronounced, while vigorous measures to promote the export of manufactures are maintained. The members of the Andean Sub-regional Integration Agreement (Venezuela, Colombia, Ecuador, Peru and Bolivia), that 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 program for automobile production in 1977. Other sectoral programs 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 they are a new phase with emphasis on export promotion in Latin America. Actually, however, import substitution and export promotion, in our view, go on 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.

Having as background knowledge what has been described, let us now discuss the characteristics of the Latin American trade structure, focussing 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 dimension for implementing secondary import substitution policies has often been raised and this pertains 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 not to be recommended, particularly if supported heavily 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 worthwhile noting. Despite our 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 bias 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 transportation equipment in exports of manufactures in recent years seems to differ not very much 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 big 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 having 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 endowment. The resultant effect is that special efforts are required to be successful 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 under-estimated.

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.

2. Expansion of international trade is a crucial requirement for overcoming the chronic tendency towards an external 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 Section I, 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 has previously been touched upon in relation to technological progress. As is well known, the products of engineering industries, and especially the automobile industry, are illustrative in this respect, but they 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 favor 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 favor of the lower classes, as will be discussed later.

Analytically, economies of scale cannot precisely be 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 favorable 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 market expansion had been kept at the same rate of increase. This is the period of "investment spurt" on which the previous discussion has touched. Naturally, 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 country of large size, capital investment for the infrastructure can be said to be an important condition, and this is certainly true for Latin America. Nevertheless, what is of concern to us here is to suggest 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 endorse the validity of 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 on both groups of countries, however, the statistical evidence for asserting such a view does not seem to be convincing enough and would need more 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 vs. 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 the absolute poverty is mostly found in the rural districts. Leaving the first aspect for the later discussion, let us discuss the second one in some detail below.

A rise in the real wages of unskilled labour is the most crucial indicator which demarcates 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 denied in the whole. 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 the 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 because of the slower pace of labour demand expansion but also because of 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 less rigorous sense. Japan's case suggests that during the process of semi-industrialization, surplus labour has also sometimes been reproduced, suggesting an occurrence of the situation probably similar 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.

3. Agriculture is still one of the most important sectors of the 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 from the viewpoint of 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 sub-sectors 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 it 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 sub-sectors 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 sub-sector, together with the potentiality of expanding the area of cultivated land, is of great importance for foreign countries which have to import food and feed stuff like Japan. The latter sub-sector of peasant farming is of direct concern in the present condition, as the technological and institutional innovations of appropriate type have not taken place in this sub-sector. As will be described in more detail in Chapter 2, Part II, there seems to be great future potential for encouraging and promoting such improvement and innovations, in our view. The expected progress along this line 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 applied 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. There are the areas where labour-intensive technologies are appropriate. Needless to say, there is no inconsistency between this emphasis and that of the importance of accelerating output and increased productivity in the industrial sector mentioned earlier. In recommending development of such small-scale industries, our presumption 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 COOPERATION BETWEEN LATIN AMERICA AND JAPAN

INTRODUCTION

The 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 cooperation 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 1960's to 5.0% during the second half of the 1970's. 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 of Japan's exports to Latin American countries than of the latter's exports to Japan, the trade balance between the two became unfavorable for Latin America towards the end of the 1960's 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 1960's, after experiencing a relatively slack period. As a result, as of the end of March 1979, the cumulative approved investments from Japan totaled 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 cooperation¹ to Latin America amounted to US\$2,702 million or approximately 30.2% of the total funds of US\$8,948 million dollars 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 cooperation, 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, the relationships 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 cooperation to facilitate the attainment of the desirable expansion of economic relations seems highly important.

The purpose of this chapter is to present the conceptual frame for the studies on such mutual cooperation (included in Part II of this report) as well as to summarize systematically the principal conclusions of the studies on cooperation in specific areas.

I. ECONOMIC AND SOCIAL DEVELOPMENT AND INTERNATIONAL COOPERATION

1. Basic Economic Features of Latin America and Japan

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 at which the

1 Including direct investments.

main countries of the region have arrived while the others are now arriving, second, the advantage of rich natural resources that most countries of the region share and third, the great internal market that have some countries or regional groupings (as the Andean Group) of Latin America. 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 1960's, 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 long distance between the geographical locations of Latin America and Japan could have some important implications for their mutual economic relations, particularly as regards trade and transport.

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 I. 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 this country 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 of 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 growth of the economy. This would pose, on the other hand, delicate problems of external sector bottleneck. Therefore, it should 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, the cost of labour remaining to be 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 of these goods increases very quickly, imports by Latin America from those countries will be very dynamic with the only limitation imposed by the 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 increased very much 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 Thoughts on the Necessity and Forms of Cooperation

It seems obvious that some cooperation is necessary in order that the economic relations may 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 cooperation. 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 simple complementarity, should also constitute one of the basic principles of cooperation.

There are different options (and forms) through which both sides can cooperate, but it is necessary to adopt the most appropriate one in order to maximize the above-mentioned mutual benefits. In this sense real cooperation should mean that both sides must make policy adjustments, institutional adaptations, and other efforts under the framework or forms of cooperation to be adopted as most appropriate, in order that the cooperation 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

cooperation, it should be solved by joint efforts through coordination and adjustment.

More specifically, we may take the case of cooperation 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 cooperate 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 coordination with the efforts of technology exporting countries. The forms of "real" cooperation should envisage coordination and adjustment of the actions of both parts to assure such results.

In the past, there has been successful expansion of financial cooperation, including big 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 cooperation 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 II, that in addition to financial cooperation, particularly in respect of large-scale industry and resource development, cooperation for introducing technological and institutional innovation should be extended, especially to small and medium units of production in agriculture and manufacturing.

3. Scope of Cooperation

In order that the cooperation mentioned above may be realized, cooperation efforts must not be made in an isolated manner, as has happened sometimes in the past. Furthermore, one form of cooperation should be coordinated and integrated with others and a certain balance between one type or area of cooperation with the others should be maintained.

Therefore, future cooperation should be as global as possible in the sense of covering different areas and forms of cooperation, while at the same time it should be systematic, in the sense that the different areas and forms of cooperation should be well coordinated 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 cooperation 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 cooperation mentioned above. Chapters I, III, IV and V of Part II of this report analyze specific aspects of the respective sectors and examine possibilities and new forms of cooperation 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.

II. NEW FORMS OF COOPERATION IN INDUSTRY AND AGRICULTURE

1. Basic Features of Industry and Agriculture in Latin America and Characteristics of Cooperation

As mentioned in the previous section, cooperation should be based on mutual benefit. However, the nature of such mutual benefit may be different according to 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 cooperation 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 intensification 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 high 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 significantly 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 analyze 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 were prevailing when "modern economic growth" was initiated, particularly the unequal distribution of land and other resources, which remains unchanged in most of Latin America countries in spite of their programs 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 in 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., have obtained annual increases in yield of 3.8% in the period from 1961/65 to 1974/75 and intermediate (or transitional) crops such as corn, coffee, etc., have registered a 1.7% increase, yields of traditional crops such as rice and beans have 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 1961/65 to 1974/75, 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 unfavorable 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 Sao 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 that they have not yet produced considerable 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,² medium,³ and small,⁴ 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.

2 Enterprises with 251 persons or more.

3 Enterprises with 51 to 250 persons.

4 Enterprises with 6 to 50 persons.

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 of technological progress, at least under the prevailing institutional set-up. Nevertheless, it would be important to analyze 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 Cooperation

General aspects

Having the above-mentioned background in mind, a global approach should be adopted for the future cooperation between Latin America and Japan. The cooperation for the production, trade and transport of commodities and manufactures could be made effective through different forms of cooperation in the fields of direct investment, technology, finance, etc.

Here, new forms of cooperation would be considered at two different levels. First, mention would be made to general aspects of cooperation concerning particularly trade, direct investment and technology. Second, new forms of cooperation would be discussed at more specific level 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. The cooperation 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: Trade chambers 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 on foreign markets, particularly Japanese one, modalities to operate in these markets and diffusion of information of these aspects among Latin American enterprises should be also important.
- 2) Cooperation of Japan with some of the integration processes of Latin America (as the Andean Group and the Central American Common Market) to reinforce joint action of 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 countries of Latin America, to transmit them relevant aspects of the knowledge to operate in foreign markets, especially the Japanese one. These activities can be carried on in cooperation with appropriate Latin American training and academic institutions.

As for the cooperation for 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 with the Japanese share having increased substantially. The distribution of such direct investment by economic sectors shows a strong preference for manufacturing, with a decrease of the shares of 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 give way to 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, cooperation 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 cooperation 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 the one that could be useful for small and medium sized Latin American firms.

- 2) Cooperation for the establishment and strengthening of national and regional centers for technology,
- 3) Cooperation for the better knowledge of governments and enterprises of Latin America about the possibilities to use Japanese technology.
- 4) Technical training of personnel.
- 5) Technical consultancy and engineering services.

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

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 achievement 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 favorable 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-a-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 reconcile 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 Asian newly industrializing 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 internal consumption, or else an increase in food imports. According to the 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 enterprises of the manufacturing sector, 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 I, 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 on the experiences 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 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 cooperation may be summarized as follows:

In agriculture, (i) technical cooperation to smaller farmers, including improvement of their organization, should be given high priority. As Japan has long experience in intensive farming and organization of small farms such as agricultural cooperatives, it would be able to cooperate appropriately 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 farms, could be supported and in some cases complemented by Japanese cooperation in this field. (ii) Furthermore, Japan could cooperate 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 cooperation 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 cooperation with experts of Latin American countries in the same field who know local conditions better. (iv) Japan could also cooperate 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 cooperate as well with Latin American countries for the processing and export of the agricultural products.

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

In the field of technical cooperation, the program for specific areas identified as of high priority for cooperation with Japan should contemplate, among others:

- 1) technical cooperation with small and medium industries, particularly in the production processes most appropriate for these industries;
- 2) technical cooperation in fields that permit more intensive integration between enterprises of different sizes: standardization of industrial norms and specifications, quality control etc.;
- 3) cooperation 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, specially of small and medium industries;
- 4) training of engineers and workers in order to support the above-mentioned technical cooperation: in particular, preparation of specialized group of instructors who can make multiplier effects for technological progress, even after the cooperation program with Japan finished.

In the field of financial cooperation, higher priority should be given to finance for small and medium enterprises. Some efforts have been already made to extend financial cooperation 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 cooperation in respect of trade, improvement of the capacity of competition of Latin American manufactures appears to be most necessary, particularly, if they have to face severe competition from products exported to Japan by neighboring countries, particularly the newly industrializing countries of Asia. The above-mentioned technical and financial cooperation could be effective for improving the capacity of competition 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 of Latin American products, and so on.

Cooperation at the private sector level could also be important. Cooperation of joint ventures between small and medium enterprises of Latin America and Japan 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, practice in exporting manufactures.

III. NEW FORMS OF COOPERATION IN NATURAL RESOURCES DEVELOPMENT AND TRANSPORT

1. Characteristics of Cooperation in Natural Resources Development and Transport

The cooperation between Latin America and Japan in these sectors has different characteristics in comparison with the sectors covered by the previous section. Its principal features would be the following:

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

- 2) In order that cooperation in these sectors may be beneficial for both sides, increased output with higher capacity of competition in the international market or higher efficiency in transport services should be attained. In this sense, the criterion of the new forms of cooperation 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 cooperation that are feasible and acceptable to both sides. For example, in cooperation for the development of production of feed grains, Japan should cooperate not only in finance, which in general produces more favorable effects for large farms, but also in technology and other inputs which are not linked with size of enterprise. Increases in exports of processed materials with higher value added should be considered in the case of cooperation for export-oriented food and minerals production. Cooperation in regional development that could be undertaken as an integral part of natural resources development, including export crops production, should be another complementary element in this sense.
- 4) As for the development of natural resources (particularly non-renewable resources), a long-term overall development program (particularly for industrialization) that would be supported with the funds obtained by the export of natural resources should be fully taken into account. The very high rate of increase of extraction of oil for export, for example, is not desirable if it is not consistent with plans of industrialization and socio-economic development of the country concerned.
- 5) Cooperation to promote the introduction of technological and institutional innovations is also highly relevant in these sectors. In ocean transport cooperation, for example, technological innovation such as containerization, with the equitable participation of both sides, could not be realized without making certain kinds of institutional adjustments or innovations.

2. Basic Features of Mining and New Forms of Cooperation

Among the different products of the mining sector, iron ore is probably the most important one for economic relations between Latin America and Japan. Furthermore, the iron ore trade would be one of the most important examples of a case where the mere continuation of past trends in mutual trade would not satisfy in the future the 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 consciousness 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 cooperation and coordination 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 cooperation 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 approach in order to secure 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 cooperation are being given a more explicit role in the projects for resources development, on the basis of a wider concept of such cooperation.

Bearing the above-mentioned facts in mind, as well as taking into account the past experience in joint efforts of Brazil and Japan in the development of iron ore mining and trade, the desirable new forms of economic cooperation 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 on the possibilities of development of new mines.
- 2) Closer financial and technical cooperation for the development of natural resources as well as cooperation 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 be the equity participation of importing countries to a certain proportion. 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 the increase in 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 cooperation to maximize mutual benefits appears to be great in the field of overland transportation, loading and maritime transportation.
- 5) Stronger 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 export industry with international competitiveness, mining activities should not form just an enclave in the national or regional economy. The 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 cooperation based on the introduction of suitable technological and institutional arrangements can be expected. Both the

Japanese Government and enterprises of related industries and trading sectors could participate actively in this kind of cooperation. Japan has a good deal of experience in carrying out cooperation of this type through new institutional frameworks.

- 6) Cooperation 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 cooperation on the treatment of ores containing impurities such as sulphur and phosphorus as environmental regulations become stricts. Cooperation in the construction of steel plants would be the most advanced form of cooperation in this field. Japanese experience in Latin America and elsewhere has demonstrated the high effectiveness of such cooperation 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 Cooperation
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 cooperation 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 of 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 cooperation 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 straight forward introduction of new technologies difficult. Therefore, as mentioned later, a step by step approach to cooperation 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 plants (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 on the prerequisites for containerization and the possibilities of introducing combined large-scale cargoships mentioned in Chapter V, Part II of this Report, the following fields and forms of cooperation 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 cooperation could be considered with due account being taken of past experience in this field.

- 2) In the field of shipbuilding, financial and technical cooperation between Japan and Latin America has already been undertaken. Cooperation 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 cooperation 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, cooperation 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 gradually 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 cooperation scheme for full container systems should be established. In all these stages, Japan should cooperate 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

cooperation activities for full container terminal operations, container inventory control, etc.

- 4) Cooperation in other related areas of maritime transport will be indispensable for successful cooperation 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.

IV FINAL REMARKS: OBSERVATIONS ON SOME OTHER ASPECTS RELATED WITH ECONOMIC COOPERATION

The study contained in this report does not cover all aspects of economic relations and economic cooperation between Latin American countries and Japan, and there may be some important aspects which are not covered here. The specific aspect of financial cooperation could be an example, although studies of all sectors included in this report refer explicitly to the financial cooperation relating to the respective sector. Specific aspects of finance and other fields which are not covered fully in this report are analyzed in other studies.⁵

Another important aspect relating to economic cooperation 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.

⁵ See for example Inter-American Development Bank and Export-Import Bank of Japan, Latin America/Japan Business Cooperation Symposium (Proceedings), 1979 and Hosono, Akio "Trade and financial relations between Latin America and Japan: Prospects and possible lines of action" in Urquidi, Victor and Throp, Rosemary (eds.), Latin America in the International Economy, London, Macmillan, 1973.

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 cooperation 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 improve their overall industrial efficiency through such cooperation sufficiently to compete with the manufactures exported by the newly industrializing countries of Asia to the Japanese market. It is also important to cooperate 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 cooperation in the various new forms discussed here or in any other forms.

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 cooperation 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 is behind this suggestion. As mentioned in the Report, possible new forms of economic cooperation for the future can effectively be pursued only when these are considered in unseparable relationships with the development strategy of each individual country in long-term perspective. This would require further efforts in bilateral research cooperation between the country concerned and Japan.

Action in specific directions can be taken only after an opportunity, as mentioned above, is fulfilled. 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 cooperation 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 cooperation with the less advanced countries in the future along the trends of the recent past. Japan's economic cooperation 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 cooperation beyond narrow frame of donor vs. recipient country. Of the wide implication involved in this approach, the following suggestion may be illustrative. Transfer of highly sophisticated technologies will continue to be the major area of technology cooperation of 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 cooperation 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 II

CHAPTER 1 INDUSTRIAL STRATEGY AND NEW FORMS OF COOPERATION

INTRODUCTION

A study on new forms of cooperation 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, of which main features are: higher priority to the 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:¹

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

1 See ECLA, International Co-operation for Industrial Development in Latin America (E/CEPAL/CONF.69/L.3), 1979, pp.102 and ECLA, Economic and Social Development and the External Economic Relations of Latin America (E/CEPAL/1061) February 7, 1979.

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 assure the attainment of them. However, Japanese experiences of economic development and trade seem to suggest the possibility of accomplishing them at the same time. On the other hand a full consideration should be made regarding special aspects of Latin America, some of them favorable and other unfavorable: availability of abundant resources, high rate of increase of labour force, etc.

The purpose of this chapter is to analyze the possibility of industrialization at semi-industrial phase that assure higher rate of increase of employment and export of manufactures, with special reference to Japanese experiences, 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 cooperation between Latin America and Japan.

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

1. Industrialization in Latin America and its Effects on Employment and Export

(1) General remarks

Studies of ECLA and other authors² analyzed the pattern of the industrialization in Latin America and its effects on domestic economy

2 ECLA, The Economic and Social Development and External Relations of Latin America, 1977; Fichet, Gerard and Norberto González, "The production structure and dynamics of development," CEPAL Review, Second Semester 1976. Little, Ian, 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

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.

As for the first point we got the important finding in the Part I Chapter I: 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 the estimates of ECLA.³

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 scaled 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

Developing Countries, Johns Hopkins Press, 1971; Balassa, Bela, Development Strategies in Semi-industrial Countries, IBRD, 1969. Carbo, V. and P. Meller, Sustitución de Importaciones, Promoción de Exportaciones y Empleo: El Caso Chileno, CIEPLAN, 1977.

3 ECLA (Feb. 1979) Ibid.

ones and have attained high capacity of competition in the world market.

In this sense, it should be important to assess the situation of small and medium enterprises in Latin America as well as their contribution to employment and export, particularly in the light of Japanese experiences. This analysis could elucidate some of the key elements that could explain at least partially limited effects of the industrialization in Latin America on employment and export 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 employment distribution and the capacity of employment 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.).

(2) Comparison of employment distribution by scale of establishment in Latin America and Japan

Employment distribution among enterprises of different scale in Latin American manufacturing industry differs considerably from that of Japan. First, comparison is made with respect to 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 case of Japan 4 to 49 persons) is considerably smaller in Latin American countries than in Japan. While in most of Latin American countries, about 30% of the 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, and 34% in Chile 1967, 29% in Argentina 1954), in Japan about 40% or more (45% in 1955) corresponded to this group in the period of 1955 to 1965.

Even if slightly large enterprises (those with 50 to 99 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 persons, in Latin America 34 to 42% (according to different countries) corresponds to these enterprises.

Another important difference between employment distribution by scale of 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 the persons occupied in large 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 why these differences between Latin America and Japan is observed could be that the cottage industries (or "micro-industrias" as commonly called in Latin America; for the time being we consider those establishments with 5 persons or less "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.

As a matter of course the industrial censuses should be used to prove the possibility. Nevertheless, the industrial censuses in Latin America, in many instances, omit the cottage industries or their coverage regarding them are limited. For example, as for Mexico, where according to the census, enterprises of smallest size (1 to 4 persons including self-employed persons) absorbed 19.4% of industrial labour force in 1960, it was estimated by ECLA that the cottage industries absorbed 35.7% of labour force in the same year.⁴ (See Table 3)

4 ECLA, op. cit.

Table 1 Latin America, Distribution of Persons Employed in Manufacturing Industries

		— Number of persons per establishment —				Total (%)	(Absolute number) (100 persons)
		5-19 (%)	20-49 (%)	50-99 (%)	100 & over (%)		
* Argentina	(1954 Census)	16 ¹⁾	13 ²⁾	13	58	100	
* Brazil	(1959 Census)	16	12	11	71	100	1,644
"	(1970 Census)	16	14	12	58	100	2,428
"	(1974 "Pesquisa")	10	12	13	65	100	3,374
* Mexico	(1961 Census)	11 ³⁾	22 ⁴⁾		67	100	824
"	(1970 Census) ⁵⁾	12 ³⁾	9 ⁶⁾	13 ⁷⁾	66	100	1,382
* Colombia	(1960 "Encuesta")	19	15	12	54	100	245
"	(1965 " ")	19	14	12	61	100	283
"	(1970 Census)	12	14	13	61	100	346
"	(1975 "Encuesta")	7	14	13	66	100	456
* Chile	(1957 Census)	15	15	12	58	100	207
"	(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 ⁸⁾	19	11	44	100	4,958
Japan	1960	20 ⁸⁾	18	12	50	100	7,602
Japan	1965	23 ⁸⁾	16	12	49	100	9,481

Source: For those data with asterisk: ECLA, "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).

Notes: 1) From 11 to 25 persons employed. 5) Include mining.
 2) From 26 to 50 persons employed. 6) From 26 to 50 persons employed.
 3) From 6 to 25 persons employed. 7) From 51 to 100 persons employed.
 4) From 26 to 100 persons employed. 8) From 4 to 19 persons employed.

Table 2 Overtime Change of Distribution of Persons Occupied in Manufacturing Industries

	(%)					
	Small (5-49) ¹⁾	Medium (50-249) ²⁾	Large (250 & over) ³⁾	(of which 500 & 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			

Sources: Brazil and Colombia: calculated from Industrial Census.

Mexico: PREALC, Diferencias de Remuneraciones y Coexistencia de Establecimientos de Distinto Tamaño: Mexico 1965-1975, Sept. 1978, Santiago.

Peru: Haro, Rodolfo and Gunilla Ryd, "Notas sobre el Desarrelleco, la politica industrial y las condiciones de coexistencia de la pequena, mediana y la gran industria en Peru 1963-1973" (draft).

Notes : 1) 4-49 for Japan, 6-49 for Mexico.

2) 50-199 for Colombia and Peru.

3) 200 and over for Colombia and Peru.

Table 3 Manufacturing Industry, by Scale,
and by Groups of Countries 1960

	Employment in "micro industrias" (Cottage Industry)	Employment in Manufacturing Industry, by Scale (number of persons employed per establishment)				Total	Total in absolute number (1,000 persons)
		5-19	20-49	50-99	100 & 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
Sub total	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
Sub total	54.2	10.3	7.4	4.9	23.2	100.0	2,231
Group III							
Sub total	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: ECLA, "Small-scale Industry in the Development of Latin America," Economic Bulletin for Latin America, May 1967.

Another study estimated that enterprises with 1-5 persons absorbed 40.1%, 41.2% and 41.7% of labour force of manufacturing industry in 1965, 1970 and 1975 respectively.⁵

⁵ According to the definition of industrial census of Mexico 1975. This includes certain activities of repairing. Data of 1965 and 1970 are adjusted to this definition. Labour force absorbed by this activity amounted to 189,900 persons in 1970 that corresponded to 20.1% of the above-mentioned figure of cottage industry. In other words, those who engaged in certain activities of repairing constitutes 8.1% of total labour force of manufacturing industry according to the above-mentioned definition. See page 8 and methodological appendix of García, Norberto, "Microindustrias en el sector manufacturero de México" PREALC, 1978 and page 1 of PREALC, Diferenciales de Remuneraciones y Coexistencia de Establecimientos de Distinto Tamaño: México 1965-1975, 1978.

As for Brazil, the difference between the persons occupied by enterprises of 6 persons or more covered by the Industrial Census and the total persons occupied by the manufacturing industry covered by Demographic Census give us a very preliminary approximation of the persons occupied by the cottage industries of 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 the estimate of ECLA for the latter year is 43.9%.⁶

As for Colombia the persons occupied by the "handicraft manufacturing" amounted to 51% of the total occupied persons in manufacturing industry in 1970 according to an ILO study,⁷ while the study of ECLA already cited 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 ECLA estimated 46.2% for 1960.⁸ Regarding Peru, Fitzgerald estimated that 66.4% of the labour force of manufacturing industry was occupied by the "informal" cottage industries in around 1968 (before reforms),⁹ while the study of ECLA estimated 61.5% for 1960.

In Japan, the proportion of labour force occupied by cottage industries diminished from 34.5% in 1955 to 19.7% in 1960 and since then this percentage remained almost unchanged (17.6% in 1965, 19.0% in 1970 and 20.7% in 1975).¹⁰

6 See appendix tables at the end of this chapter.

7 International Labour Office, Towards Full Employment: A Programme for Colombia, Geneva, 1970. It should be worthwhile to note that the projection made by this study for 1985 assumes that this percentage of handicraft manufacturing's employment in the total labour force of manufacturing industry would remain unchanged.

8 Tokman, Victor, "Las relaciones entre los sectores formal e informal," Revista de la CEPAL, Primer semestre 1978.

9 Fitzgerald, E.V.K., The State and Economic Development: Peru since 1968, Cambridge 1976.

10 These percentages are the difference between the number of persons occupied by enterprises of 4 persons or over registered by the Industrial Censuses of 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 the World War Two was 32.0% (1940). See "Industrial Development and the Traditional Small-scale Industry" (mimeo).

There are some data that permit a limited analysis of overtime trend of employment distribution by scale of enterprises in Latin America. As far as enterprises with 5 persons and over are concerned, in four of the five countries for which overtime data was available, labour absorbed by larger enterprises (more than 200 persons for Colombia and Peru) increased at a higher rate than the labour absorbed by small and medium enterprises as shown in Table 2.

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

Lower rates of increase of persons occupied by small enterprises are also pronounced in case of Colombia, as is shown in Table 5. It is important to note that increase of the share of large enterprise in employment in Colombia was much more pronounced in the period of accelerated industrial development (1967-1974) in comparison with the period of moderate rate of development (1959-1967).¹¹

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

In accordance with the above data, the important characteristics of the employment distribution of the manufacturing industries in Latin American countries seems to be:

11 Haro, Rodolfo y Gunilla Ryd, "El papel de la pequeña y mediana industria en el proceso de industrialización de Colombia," Dec. 1979 (draft).

- 1) The participation of typical small (and in some cases medium) enterprises in the employment distribution is considerably lower in Latin America than that in Japan. Furthermore, in some of the main countries of the region small and medium enterprises have failed to increase the persons occupied by them at the rate of the larger enterprises.
- 2) Instead, 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 employment distribution by scale, relatively high proportion of labour force are absorbed by the large scale enterprises.

These characteristics of manufacturing industry in Latin America should be highly related with the particular process of the industrialization of the region and might suggest that, in the process, simultaneous development of enterprises of large and small-medium size have not taken place in such a pronounced way as in Japan and there remained a considerable amount of persons engaged in cottage industries.

(3) Observations on conditions of coexistence 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 that in Japan and, in some of the main countries of the region, small and medium enterprises have failed to increase the persons occupied by them at the rate of the larger enterprises.

Therefore, the crucial point is 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 analyzed this aspect and got some important conclusion regarding

the necessary conditions for this simultaneous development.¹²

In this study it is assumed that "a prime condition for coexistence 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 to be relatively labour intensive enterprise (that is relative share of labour is higher in SSE than in LSE), the necessary condition for the coexistence of SSE with LSE is that wage differentials by scale are larger than those of labour productivity by scale and that these are still larger than the differentials in the capital labour ratio by scale.¹³

12 In this study it is assumed that a prime condition for coexistence of both SSE (for which stands suffix 1) and LSE (for which stands suffix 2) is a state of equal return on capital, from which we get

$$\frac{\pi_1}{\pi_2} = \frac{Y_1 - w_1 L_1}{K_1} / \frac{Y_2 - w_2 L_2}{K_2} = 1 \quad (1)$$

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)

$$\frac{z_1 (1 - \beta_1)}{z_2 (1 - \beta_2)} = 1 \quad (2)$$

where β indicates relative share of labour ($= \frac{wL}{Y}$) 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 for postwar Japan suffices the conditions for case 1 and it can be said that cases 1, 2 and 3 identified above are necessary conditions for the coexistence of SSE with LSE.

13 See Kazushi Ohkawa and Mutsuo Tajima, Small-medium Scale Manufacturing Industry: A Comparative Study of Japan and Developing Countries, IDCJ, 1976. Tajima, Mutsuo, Small-medium scale manufacturing industry: Further discussion in a comparative study of Japan and developing nations, IDCJ, March 1978.

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

- 1) Smaller scale enterprises have higher capital productivity (output capital ratio) than larger scale enterprises do; and
- 2) Wage differentials by scale are smaller 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 its lower labour productivity, to coexist with large scale enterprises (LSE) as long as the former chooses a relatively labour intensive technology and realize a higher output capital ratio than the latter; and
- 2) In the economy where no wage differentials exist, there is also possibility of coexistence of SSE with LSE as in the case 1). The capital productivity of the former must also be higher than the latter. This implies that the significance of wage differentials (lower wage for SSE) is less than that of technology.

Now the tendencies observed regarding the coexistence and simultaneous development of small and medium 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 in these countries necessary conditions for simultaneous development mentioned above are satisfied. Unfortunately available data for this kind of investigation are limited, 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 Mexico¹⁴ although the curves are not so systematically downwards as 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 case of Chile, Peru,¹⁵ Costa Rica,¹⁶ and Colombia¹⁷ with respect to the curves of output capital ratio and relative share of labour (see Appendix Tables).
- 3) In general terms differentials of wage, labour productivity and capital labour ratio by scale appears to have normal upward curves in such a way that satisfy the necessary conditions for small and medium enterprises to coexist with large ones, although the curves are sometimes not so systematic and pronounced as in case of Japan and show some irregularities, for all countries for which data are available except Colombia (Brazil, Mexico, Peru and Costa Rica). (See Appendix Tables.)

These findings can be tentatively interpreted as follows:

First, in case of Mexico, the observed irregularities in the curve of output capital ratio for the certain segments of small-medium enterprises (or most "typical" small and medium ones) may be explained partially by the particular nature of the industrial structure of Mexico: a large percentage of small and medium enterprises belong to the so-called traditional industries. According to a PREALC study¹⁸ approximately 75% of the persons occupied in the enterprises of 15 to 50 persons belong to the typical traditional industries such as textile, clothes, shoes, non-metal mineral products, furniture, etc. of which

14 PREALC, Diferencias de Remuneraciones y Coexistencia de Establecimientos de Distinto Tamaño: Mexico 1965-1975, 1978.

15 Haro, Rodolfo and Gunila Ryd, Notas sobre el Desarrollo, la Política Industrial y las Condiciones de Coexistencia de la Pequeña, Mediana y Gran Industria en Perú, 1963-1973. (Draft), 1980.

16 Haro, Rodolfo and Gunila 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. (Draft), 1979.

17 Haro y Ryd, El Papel de.....

18 PREALC, Ibid.

capacity to increase the productivity is limited because of their organization and technology.

Second, irregularities, sometimes extreme ones found in 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 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.

(4) 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,¹⁹ which appear to be confirmed by preliminary studies of Colombia, Peru and Costa Rica.

In case of Mexico, the following observations can be obtained from the analysis. (See Figures 1 to 4 and Appendix Tables). i) The curve of output capital ratio represent in both years less pronounced downward slope compared with that of Japan. ii) It is important to note that, in addition to this, there are certain segments of small and medium industries where the curves of relative share of labour show upward slope (instead of normal downward slope). iii) These two facts seem to determine that considerably low level of rate of return on capital appears in

19 PREALC: Diferenciales de Remuneraciones.....

such segments as those consisted 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 most relative participation in employment as well as 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 enterprises of smallest size included in this analysis which has higher rate of return in comparison with typical small-medium enterprises did not lose their relative participation in employment. (See Table 4)

In other words, it could be sustained that in Mexico, the relative share of enterprises of typical small-medium enterprises in number of occupied persons decreased precisely because the conditions of simultaneous development discussed above were not satisfied. What is important here is the fact that these unfavorable conditions for those enterprises (relatively low rate of return on capital) was 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 should have happened in Mexico in the period considered (1965-1975) could probably be the following: the improvement in the conditions of simultaneous development was not obtained via increase in labour productivity, because of the limited technological progress in small and medium enterprises in comparison with large enterprises, as the formers are consisted mainly of so-called traditional industries as already mentioned. (See Table 5)

In case of Peru where the share of small enterprises in employment distribution decreased considerably in the period of 1963-1973, the conditions of simultaneous development changed against small enterprises because output capital ratio increased at 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 unfavorable 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 capital labour ratio by scale.

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: Mexico 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 (1,000 pesos of 1965)	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 (1,000 pesos of 1965)	10.5	15.2	19.3
Annual Real Rate of Increase of Wage Rate	1.9	3.3	4.05

Source: Same as Table 4.

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 lower rate than larger ones. While level of this indicator for enterprises of 200 persons or more was less than 70% of the level of enterprises of 15 to 19 persons in the period of 1959-1963 it increased to 100 or more in the period 1965-1975. Although during these two periods wage differentials increased, relative rate of return on capital of small enterprises deteriorated clearly with respect to large ones. And it can be sustained that this deterioration was originated principally by the low rate of increase of labour productivity in small enterprises in comparison with large ones, although differentials by scale in capital labour ratio also get more pronounced in the same period. It should be important to remember that in Colombia, the small enterprises lost substantially their share in the employment distribution in the whole period considered, but particularly in the period of accelerated industrial growth (1967-1974), when the deterioration of the conditions for simultaneous development was observed.

Here again the labour productivity appears to be very important for the development of small enterprises. In this sense, the case of Costa Rica calls special attention, because the wage differentials is very small in this country. The important fact is that, in spite of this, a very systematic downward curve of output capital ratio and of rate of return on capital is observed. And it is caused precisely because the productivity of labour differentials by scale is much less than the capital labour ratio differentials by scale. This means that in Costa Rica, where wage differentials is very limited, particularly with respect to workers directly involved in the production, the small and medium enterprises coexist with larger ones because of relatively high output capital ratio and high labour productivity, which should have been obtained by relatively high technological level.

Now what should be asked is 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 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 that compensate the deterioration is limited. It is probable that as in case of Mexico, a large part of the small and medium industries is consisted of traditional industries with limited possibility of technological progress at least under the prevailing institutional set-up. Nevertheless it should be important to analyze why, then, non-traditional small-medium enterprises could not 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 explained, to a large extent, by the discriminating industrial policy and measures against small and medium enterprises. It is one of the principal conclusion of the PREALC's study on small enterprises in Mexico cited above that they had very limited access to resources compared with large enterprises, among others, internal and external finances, foreign exchanges, technical assistance and training of workers.

The linkage of small-medium industries with large industries should be also very important for small-medium enterprises to develop simultaneously with large ones. It was suggested by the authors of the study on Colombian case above cited that the lower rate of increase of persons occupied by small enterprises in Colombia in the period of the accelerated industrial growth under the "open" external policy should be closely connected with the process of "disintegration" of the small enterprises with larger ones because the latter preferred to import the components and materials which were supplied internally in the previous period.²⁰

20 Haro and Ryd, El papel de

Therefore, in order to satisfy the necessary conditions for simultaneous development, it should be indispensable to modify the general economic policy in favor 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 technological 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

(1) General remarks

As Latin American countries are making efforts to develop capital and intermediate goods producing industries and at the same time to increase the employment opportunities, one of the most important aspects is what 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 permit the necessary conditions 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 sub-sectors 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 there have been parallel (and in many cases integrated) development of both labour intensive and capital intensive sub-sectors. This was mainly due to the development of labour intensive sub-sectors that have high inter-linkage with capital intensive sub-sectors.

While the technological rigidity and/or economy of scale effects are clearly confirmed in certain sub-sectors such as iron and steel production, production of automobiles (particularly that of car-bodies and engines), basic petrochemical products (ethylene monomers, and so on), 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 by use of blast 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 the 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 persons. Something similar could be confirmed with respect to automobile industry. The major motor-vehicle industries of Japan reached in the mid-1960 a scale of production equal to that of the European countries, that obliged 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 the 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 workers were engaged in establishments of less than 500 workers. Similar cases are found in other sectors at disaggregated level.²¹

Consequently, the factor intensity of a sector at aggregate level is determined not only by its corresponding technology -- sometimes very

21 Hosono, Akio: "Industrial Development and Employment," CEPAL Review, Second Semester, 1976.

rigid -- but also by the combination of sub-sectors (product mix) that compose the sector, that is to say almost equivalently, employment distribution among different scale enterprises of the sector.²² 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 necessary conditions for simultaneous development of enterprises of different size could be satisfied in heavy and chemical industries. The findings of M-S Project already cited confirm this as for 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 curves of output capital ratio (partial capital productivity) than the cases of textiles, clothes, leather product industries (Group II),²³ and other industries (Group I).²⁴ In other words, in Group III industries, small and medium enterprises had 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 have advantages in terms of output capital ratio. Although a detailed investigation would be necessary concerning factors determining steeper curves of Group III, the wide spread existence of sub-sectors

22 The following study is highly relevant to this aspect: Ohkawa, K., and S. Motai: "Small-Medium Scale Manufacturing Industry: Further Notes on Japan's Case," International Development Center of Japan (1978, Sept.).

23 Group II consists of textile products; apparel and other finished products made from fabrics or similar materials; leather and leather products.

24 Group I consists of food and kindred fields; lumber and wood products; ceramics, stone and clay products; printing, publishing and allied industries; miscellaneous industries.

of labour intensive processes in heavy and chemical industries of Japan as mentioned before, should be of prime importance.

As was also mentioned previously, these sub-sectors are in some way or another linked with capital intensive sub-sectors, 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 the case of, say, forward linkage and the latter, case of backward linkage. There are various other cases such as petrochemical monomers and polymers and 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 particular institutional set-up in Japan as discussed later.

Consequently, from employment point of view, the investments in large-scale sub-sectors of capital intensive nature could be justified if labour intensive sub-sectors linked with large-scale sub-sectors develop simultaneously. In this sense, in order that a labour surplus economy attains labour absorbing industrialization through the expansion of heavy and chemical industries, the simultaneous development of labour intensive sub-sectors with that of capital intensive ones (or almost equivalently development of enterprises of different size) is crucial.

(2) Some observations of Latin American manufacturing industry

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

First, as for Brazilian machinery industry, the curve of output capital ratio of electric machinery, communication equipment and general machinery manufacturing sectors showed effectively much steeper slope than the corresponding curve of the manufacturing industry as a whole.

Nevertheless, in case of the transport equipment manufacturing sub-sector, pronounced irregularities are observed as shown in Table 6. Some irregularities are also found in case of non-electric machinery manufacturing.

Table 6 Brazil: Production Structure of Machinery Manufacturing Sectors, by Scale (Persons employed per establishment), 1970 *

	Y/L(y)	K/L(k)	Y/K(z)	W/L(w)	(Y-Lw)/K(π)
Electric Machinery & 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.

* For symbols see footnote 12.

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 of electric and communication machinery sector and of transport equipment sector increased with much higher rate than the persons engaged in small and medium enterprises. In case of non-electric machinery sector the increase rate was highest in the medium enterprises followed by the large enterprises, while persons employed in the small enterprises increased with lowest rate.

In this connection, it is worthwhile to cite the results obtained by Gonçalves,²⁵ who was able to use the unpublished 1970 census data of capital and obtained rate of return on capital by sector and by scale. Figure of the Table 8 is the index of rate of return calculated from his data. As is shown in this table, we can confirm 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 the table 8 in details we obtain following very important observations:

- 1) In such sub-sectors as textile products, food processing, we observe a very normal downward curves. We should add that these industries have relatively high weights in the Brazilian manufacturing industries.
- 2) Instead, as for so-called modern industries, particularly machinery manufacturing we observe rather pronounced irregularities.

This second point contrasts very much against the Tajima's findings regarding corresponding figures of the machinery manufacturing sub-sectors of Japan.

In Mexican manufacturing industry, a similar overtime tendency of employment distribution among different size of enterprises is observed. According to PREALC data, during the period 1965-1975, the persons engaged in large enterprises of both electric machinery sector and transport equipment sector increased with the highest rate and their

25 Gonçalves, Carlos Eduardo No Nascimento, A Pequena e Média Empresa na Estrutura Industrial Brasileira, Campinas, 1976.

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 %	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 %	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 %	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 %	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 %	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 %	156.2	307.7	964.0	140.0
Furnitures				
1959	29.8	13.6	7.7	3.4
1974	43.5	43.7	20.5	8.2
Increase in %	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 %	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 %	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 %	77.0	154.9	195.8	110.0
Chemical products				
1959	13.1	19.2	42.7	31.8
1974	24.0	48.8	65.5	39.9
Increase in %	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 %	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 %	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 %	172.6	206.2	196.4	158.9

Source: Same as Table 6.

Table 8 Brazil: Rate of Return on Capital
by Sector and by Scale, 1970

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

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

share in the total number of persons engaged by these sectors rose from 37.9% to 44.9% and from 44.2% to 69.4% respectively. (see Table 9).

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) (1,000 persons)	68.1	87.7	115.2	55.4	69.4	104.5

Source: Same as Table 4.

3. Contribution of Small and Medium Enterprises to the Export of Manufactures

From mid-sixties, export of manufactures increased at the 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 of the export of manufactured goods has been particularly pronounced in countries of larger size such as Brazil, Mexico, Argentina and Colombia. During the same period, some countries of Asia such as South Korea, Taiwan, Singapore and Hong Kong also accomplished substantial increase of export of these goods. Therefore, both these countries of Asia and those of Latin America cited above are called newly industrialized countries which emerged most recently in the world market of manufactured goods. It is important to note that their export is not limited to the traditional manufactures but covers rather diversified manufactures of heavy and chemical industries.

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

In Japan, high percentage of the industrial products exported by small and medium enterprises (1-300 persons engaged) in the total value of exports of manufactures have been maintained until recently. As is shown in Table 10, the percentage of small and medium enterprises is higher in light industries than in heavy and chemical industries. But 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 case of South Korea, where

the percentage of their participation slightly increased in recent years while their share in the total manufacturing production gradually decreased. (See Tables 11 and 12.)

Table 10 Japan: Share of Small and Medium Enterprises in the Exports of Manufactures

	(%)					
	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 Enterprises Agency, White Paper on Small and Medium Enterprises, 1978.

Table 11 South Korea: Export of Small and Medium Enterprises (1962-1976)

	(million US dollars)				
	Total (A) Exports	Exports of (B) Manufactures	Exports of (C) Small and Medium Enterprises	C/A (%)	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 Enterprises (Korea) cited by Bank of Small and Medium Enterprises, Small and Medium Enterprises in Korea, 1977.

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

South Korea. Although appropriate statistical information to make the 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 that of Japan and South Korea.

In case of Mexico, for example, according to a sample survey undertaken in 1975 with respect to 599 firms²⁶ which realized exports of manufactures in that year, a very limited number of firms (14 firms) realized a considerable part of total exports (42.4%), while the participation of smaller firms was low (26.7%). Here the smaller firms means the firm that exported a very small value of manufactures (less than 25 million pesos, that is approximately 1 million dollars, or an average of 3 million pesos that is 150 thousand dollars). (See Table 13.)

Table 12 South Korea: Percentage of Exports in the Total Sale of Small and Medium Enterprises (1970-1976)

	(%)						
	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 beverage	4.5	6.9	7.9	9.1	8.3	11.7	8.2
Textile, 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: Same as Table 11.

This situation in Mexico is explained by the fact that a large part of the exports of manufactures is effected by the foreign enterprises, of which scale of production is medium or large in the standard of the

26 Sample survey made by the Instituto Mexicano de Comercio Exterior (IMCE), cited by ECLA, La exportación de manufacturas en México y la Política de Promoción, pp.78-81.

Mexican enterprises. In fact, in 1975, 55% of the total exports of manufactures was made by foreign enterprises.²⁷ It should be stressed here that, the participation of these enterprises is extremely high in case of so-called heavy and chemical industries (Metal products and machinery, 78%; chemical products, 91%; etc.). (See Table 14.)

Table 13 Mexico: Distribution of Export of Manufactures 1974
by Size of Value of Exports

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: CEPAL, La Exportación de manufactures en México y la Política de Promoción, 1976.

In case of Brazil, the concentration of exports of manufactures looks much clearer. 20 firms that realized exports of manufactured goods in 1971 and 1974 accounted 35% and 30% of total value of the export respectively. On the other hand, those firms that exported less than 1 million dollars accounted only 19.9% of total value of exports of manufactures in 1974.²⁸

This situation in Brazil is partly explained by the high level of participation of foreign firms and government enterprises in the export of manufactures as in case of Mexico. According to a study made by IPEA, foreign firms exported at least 40% of total value of exports of manufactures from Brazil in 1973.²⁹ On the other hand, it is estimated that the government firms realized approximately 5% of total value of exports of manufactures.³⁰ According to the detailed data concerning the

27 Estimation made by ECLA, on the basis of the information of IMCE and Consejo Nacional de Ciencia y Tecnología (CONACYT), ECLA, Ibid., p.82.

28 CACEX, Relatorio Anual, 1971 and 1974.

29 IPEA/INPES, Relatorio de Pesquisa, No. 29, p.72.

30 García, Héctor, La Política de Desarrollo de las Exportaciones de Manufacturas en Brasil, ECLA, 1976, p.32.

largest 1,000 firms of Brazil for 1974, 155 firms of them made export of manufactures and their exports accounted 43.4% of the total value of exports. It should be added that each of these 155 firms exported more than 1 million dollars of manufactures.³¹

Table 14 Mexico: Participation of Foreign Firms in Exports of Manufactures 1975

	(%)		
	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
Beverage	100.0	67.5	32.5
Textile	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: CEPAL, La exportación de manufacturás en México y la Política de Promoción, 1976.

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

The situation of Argentina seems more or less the same as the case of Brazil and Mexico. During the period 1969-1975, 20 principal firms that realized the export of non-traditional exports (almost equivalent of export of manufactured goods) accounted approximately 35% of the total value of such exports.³²

The above-mentioned facts seem to be sufficient to conclude that the participation of small and medium firms in export of manufactures in

31 Ibid., Appendix.

32 García, op. cit., p.32.

Latin American countries is yet very limited, and is much smaller than their participation in manufacturing production. However, there are some symptoms that these firms are increasing their share of exports in certain areas. The case of the exports of shoes from Brazil, that corresponded to the 5.2% of the total value of export of manufactures in 1974 constitutes an interesting example. While the half of the export of shoes was made by 26 larger firms which effected more than 1 million dollars of exports each, the rest was exported by approximately 80 smaller firms. The export of textile products from different countries of Latin America (Brazil, Mexico, and Colombia, among others) should be another example.

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

1. General Remarks

From the analysis of the Section I of the Chapter, the following tentative conclusions could be obtained regarding the development of small and medium industries 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 (micro-industrias)" on the other, in terms of employment distribution. Instead the participation of "typical" small and medium enterprises is considerably smaller than the case of Japan.
- 2) In some Latin American countries there have been a tendency that the share of the small enterprises decreases with respect to the large enterprises. Indicators of the necessary conditions of the simultaneous development of small-medium 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 the Japanese experience.

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

The fact that small and medium enterprises failed to develop at the same rate of large enterprises should be highly related with the irregularities observed in the indicators of the necessary conditions of simultaneous development, as discussed in the previous section. The findings obtained regarding these irregularities, particularly in case of Mexico, Colombia and Peru, seem to clarify some of the important aspects of relationship between them and the overtime change of employment distribution in these countries.

The analysis of the Section 1 suggests as factors that are closely related with the tendencies mentioned above the following:

- 1) Lower rate of increase of labour productivity of small-medium enterprises. This implies that the less intensive technological progress in these industries and/or substantial technological gap with respect to large enterprises.
- 2) Lack of institutional set-up in favor of the close relationship (or interlinkage) between large and small-medium enterprises that enable cooperation between enterprises of different size.
- 3) Lack of proper channels and institutional set-up for small-medium enterprises to export their manufactured products.
- 4) Unfavorable effects for small and medium enterprises of economic policies in general and of a series of specific measures in particular an/or lack of consistent and effective policy measures in favor of small and medium enterprises, which discriminate them from the access to resources, among others financial resources, technical assistance, training of workers.

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

In the following sections, the situation of Latin American countries concerning some of the above-mentioned aspects especially those related with institutional and technological progress is examined in the light of experiences of the postwar period in Japan. This kind of analysis would help us to identify such field where the efforts in Latin American countries have not yet produced expected results and where Japanese co-operation could be useful, and therefore it will permit us to suggest possible forms of Japanese cooperation 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 Favor of Small and Medium Industries

In recent years Latin American countries are increasingly more concerned about the important role of small and medium enterprises for the attainment of four objectives of industrialization mentioned before.

Therefore, in many Latin American countries, policy measures in favor of small and medium firms have been gradually extended and diversified. Furthermore, in some countries and regions a more integrated approach has been adopted. In this sense, among recent actions of Latin American countries, the program adopted by the Mexican government by the promulgation of the National Industrial Development Plan (May 1979) should be one of the most advanced set of measures in favor of small and medium industries.

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

Secondly the PNDI establishes as principal mechanism of incentives the issues of fiscal credit certificate to be used for payment of federal taxes, and it is small enterprises that are given highest percentage of this incentive (equivalent of 25% of the value of investment with

the exception for the case that the investment is made in the federal district (Mexico City)).

In this way the important role of small and medium firms for the creation of employment is well recognized in the Plan. Therefore the PNDI not only gives incentives of general character in favor of the creation of employment opportunities applicable to any size of firms of priority sectors³³ but also give special incentives to small firms.

Thirdly the PNDI also establishes other measures for promotion of small and medium enterprises. The aim is "for the small- and medium-sized companies to link-up with the productive process of the large companies by means of sub-contracting mechanism". This, it is supposed by the Plan, will attenuate the trend of excessive vertical integration evidenced by the 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 Program of Integral Support for Small Firms in charge of Nacional Financiera (Public Financing Institution of Mexico).³⁴

The Program of Integral Support contains six sub-programs: technical assistance, pre-investment study, credit, guarantee for credit, subscription of part of capital stock and support for physical equipment. Activities of different institutions in charge of these sub-programs are coordinated through the Coordinating Committee and its Secretariat, which would formulate the basic guidelines of the program. The Nacional Financiera assigns for each sub-program a certain amount of fund which should be used in accordance with the norm established by the Coordinating Committee. The Program also envisages the preparation of expert group for the Secretariat and of industrial extensionists.

33 Priority sectors are also identified in the Plan, among others capital good producing sectors, food processing sectors, etc.

34 Nacional Financiera, Programa de Apoyo Integral a la Industria Pequeña y Médiana, México, D.F., 1978.

In Brazil, the Special Program of Assistance for the Small- and Medium-National Enterprises³⁵ was approved by the President in August 1977. The Special Program includes substantial increase of fund to finance small and medium enterprises, possibility of fiscal incentives for them, intensification of management assistance activities, promotion of new models of organizations in favor of small and medium enterprise such as system of sub-contracting exchange market, association of small and medium firms, etc.

It is important to note that this Special Program was adopted to complement the general scheme for the 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 employment is very serious, a more ambitious and integrated scheme of promotion of small and medium enterprises has been implemented.³⁶

These new schemes of 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 cooperation in favor of small and medium industries should be carried out. This approach is, we believe, not only realistic but also effective because the cooperation shall be carried out in accordance with the general guidelines of the recipient country. Japanese cooperation would complement their efforts, in general and could be very useful in some specific areas of promotion where locally available resources are not sufficient or where lack of expertise or experience could constitute an important bottleneck for the effective implementation of the program.

35 IBGE, Relatorio do Grupo de Trabalho sobre o Programa Especial de Apoio à Pequena e Média Empresa Nacional, 1977.

36 SUDENE (Superintendence for Development of Northeast Region) has been carrying out the Program of Assistance for Small- and Medium-Enterprises of Northeast Region. See, Robalinho de Barros, Frederico J.O. and Rui Lyrio Modevesi, Pequenas e Médias Indústrias, Rio de Janeiro, 1973.

In the following sections, some specific areas of the promotion of small and medium industries which seem to be relevant for Japanese Cooperation are selected from this point of view.

3. Institutional Set-up for the Integration of the Production Processes and Export of Small- and Medium-sized Enterprises with Large Enterprises

(1) Sub-contracting system

As is well known, the sub-contracting system is very widely extended and constitute one of the most important mechanisms that enable the present division of work between large and small and medium industries in Japan. In effect, small and medium firms that are related with large firms (sub-contractors) through sub-contracting system constituted 60.7% of all small and medium firms of manufacturing industry in 1976, according to the Basic Survey on Manufacturing Industry of Japan.³⁷ Furthermore it is important to note that the sub-contracting system in Japan is organized, in many sub-sectors, in such a form that the primary sub-contractor sub-contracts with secondary sub-contractors and the secondary with the tertiary sub-contractors, etc. There is multiple chains of sub-contracting and in some times, a sub-contractor is at the same time a sub-contracting firm. In other words, sub-contracting relations is just an extended and complicated network of different kind of enterprises. In case of automobile industry for example, a survey found that a large assembly firm had 171 primary sub-contractors, 5,437 secondary sub-contractors and 41,703 tertiary sub-contractors, including double countings of many firms which sub-contract each other. If these double countings are excluded, number of firms involved in the sub-contracting network of this automobile assembly company is about 39,470.³⁸

It is reported that in countries of advanced stage of industrialization of Latin America such as Argentina, Brazil and Mexico, sub-contracting system is rather developed. And in these countries, the importance of

37 Small- and Medium-Enterprises Agency (MITI), White Paper on Small- and Medium-Enterprises, 1977, Tokyo, 1977.

38 Small- and Medium-Enterprises Agency, White Paper on Small- and Medium-Enterprises, 1978, Tokyo, 1978.

sub-contracting system is recognized in their respective programs for the promotion of small and medium enterprises.

In case of Mexico, as was mentioned above, sub-contracting system is considered as one of the important mechanisms to "articulate small- and medium-sized companies with the large firms" in the National Industrial Development Plan, and the Program 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 that they stimulate the direct participation of large industrial and commercial enterprises in promotion, development and strengthening of the capacity of small and medium industries of which activities are closely related with the productive process of the large enterprises, or could be oriented to complement the productive operations of the large enterprises and assure them the supply of goods and services in adequate conditions concerning quality, timing and price. This participation of large enterprises should constitute gradually one of the most wide fronts of this Program....."

In case of Brazil, on the other hand, the Special Program of Assistance for the Small and Medium National Enterprises states: "The CEBRAE (Center of the Assistance for Enterprises) should establish the strategy of diffusion of "bolsa de Subcontratação" (exchange market of sub-contracting opportunities) according to the following steps: (a) Research and study in order to identify areas where experimental projects should be developed. For the selection of regions, all aspects related with sub-contracting 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 experiences in organizing or supervising sub-contracting system in favor of small and medium enterprises. As is well known, in spite of the different merits of sub-contracting system, it has also

some disadvantages that affect small and medium enterprises. Among others, due to their relatively weak negotiating power, they have to accept, in some occasions, unfavorable conditions established by large enterprises. Although interests of small and medium enterprises are defended by the General Anti-monopolistic Law, the Law to avoid the delay of payment of sub-contracting firms to sub-contractors, as well as to defend smaller firms against the other possible abuses of large enterprises was promulgated in 1956 in Japan.

Later, in 1970, the Law for the promotion of small and medium sub-contractor firms, was enacted. The main contents of the Law are (a) formulation of general norms to which both large firms and small and medium firms should attend, (norms regulating joint efforts for the improvement of the quality of small and medium firms' products, promotion of the organization of small and medium firms, etc.), (b) authorization of the programs of the promotion of small and medium sub-contractor firms elaborated jointly by large and small and medium firms involved in the program in those sub-sectors where the promotion of smaller firms is considered to be highly important, and (c) strengthening of the function of intermediation of sub-contracting opportunities and of solution of conflicts related with sub-contracting offered by the Association for Promotion of Sub-contractor Firms.

We will mention later on the implication of sub-contracting on transfer of technology to small and medium enterprises.

(2) Organization for cooperation among small and medium enterprises
Organization of small and medium enterprises is considered very important because it permits them to have stronger negotiating power vis-à-vis large enterprises, to facilitate the specialization among them, to cooperate among themselves in different areas, such as joint marketing of their products, joint purchasing of materials, etc.

In Brazil, the Special Program of the Assistance for Small and Medium Firms includes measures related to the "association of enterprises

to obtain services and to realize joint purchasing and selling." As complementary measures, CEBRAE is recommended to study forms to promote associations of enterprises of same or different sub-sectors in order to realize such collective actions as purchasing, marketing, setting up of laboratories for quality control, etc.

In Mexico, the Program of Integral Support for Small and Medium Enterprises does not include explicitly the promotion of associations of small and medium firms, although the support is given for physical infrastructure such as industrial parks and the establishment of service centers for industrial machinery.

Japan has a long experience also in this field which could be of some use for Latin American countries. There were approximately 43,000 associations of small and medium enterprises for joint activities, and more than 52,000 associations if other kind of organizations were included (such as associations for mutual finance, cooperatives, etc.) in 1978.³⁹ As far as the enterprises of manufacturing industry are concerned (according to a survey carried out through sampling method), 46% of small and medium enterprises participate in the activities of associations in 1976. These associations are organized in accordance with the laws and could 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 sub-contracting, joint advertisement, joint research and development (RD), finance, anti-pollution measures, training of workers, etc.

Approximately 60% of all associations of enterprises were carrying out some types of joint production in Japan in 1974. The main causes of joint production are as follows (figures in parenthesis are percentages of associations of which joint production activities mainly correspond to the respective cause):

- 1) Joint processing or preparation of materials to be used by members of the association individually (27.3%).

39 Ibid.

- 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 of which cost could be very high if they are produced individually by each member of the association (7.5%).

The associations that carry out the joint sub-contracting or coordination of sub-contracting among members corresponded to 20% of the all associations in 1974. The main purpose of this activity is to rationalize and stabilize sub-contracted production. 62% of these associations distribute jointly sub-contracted 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 sub-contracting firms and sub-contractors. Furthermore 18% of the associations accomplish the jointly sub-contracted orders by their joint production, and 20% of the associations act as organizers of the jointly sub-contracted production assigning to their members some parts of production processes.

As for other fields of joint activities, approximately 45% of associations are performing joint purchasing of materials and intermediate products, and more than 55% associations are carrying out financing for their member companies. Those associations that are doing joint investment efforts for anti-pollution equipments account more than 30% of all associations. Also more than 30% of the associations are performing joint activities in advertisement. With respect to the associations that undertake joint research and development activities, we would refer to them later. Almost 50% of all associations carry out joint program of training and 45% of training programs are related to techniques of production and marketing.

These associations are organized normally at sub-sector level. There are associations to which enterprises of different industrial sub-sectors belong. It is also very common that enterprises located in the same industrial zone or newly developed industrial park (industrial estate) organize an association. Sub-contractors also organize their associations.

(3) Organizations for export of manufactures

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

The principal institutional set-up that facilitated export of smaller enterprises in Japan are: trading companies (shosha), different kind of exporters associations and some semi-governmental organizations such as Japan External Trade Organization.

First, as for shosha, we should say that there is no exact parallel in other countries for Japanese enterprises specializing exclusively in trade, in particular those of large scale called sogoshosha (integrated trading companies) that carry on both foreign and domestic trade in all kind 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 fast expansion of export of Japan from mid-fifties, they acted as organizers, financing institutions, information centers, 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 enterprises because they did not have their own network of export channels, fund to finance exports, necessary informations, etc. The substantial part of the exports of small and medium industries is realized by the trading companies. In effect, approximately 70% of the exports of Japan is undertaken by 29 largest trading companies.

Secondly in certain fields, exporter's associations (yushutsukumiai) must have been 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 the main export item of Japan 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 of 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 Japan External Trade Organization (JETRO) meant an important support for them. JETRO provided assistance through twenty two consulting centers 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 Exportadoras" was promulgated in 1972. Now 50 trading companies are operating according to the framework established by the Decree and their exports accounted approximately 16% of total export of Brazil. In Brazil the word "trading company" is used and it is informed that this Law was enacted to introduce in Brazil some institution similar to the Japanese trading companies. Various important results have been obtained since the creation of trading companies. Nevertheless we should admit that many of them are not so called integrated trading companies, but the separated entity of the former export department of industrial firms and their activities are yet very limited. Others are exporting a few primary products. Among new trading companies recently established in Brazil, it is worthwhile to note the experiences of the State trading company called INTERBRAS which started its operation in 1975. The INTERBRAS was able to organize export 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.⁴⁰

In Mexico, the Consorcios de Comercio Exterior (kind of external trade associations) have been established since 1971 in accordance with the Presidential Resolution of 1971, which was revised in 1975. The basic idea of this Resolution was to help "the enterprises, especially of small and medium ones that did not have qualified elements to be dedicated to specialized function of marketing overseas."⁴¹ In five years since 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 dedicating to the different types of products. Towards the end of 1973, the National Association of "Consorcios de Exportación" was created by the participation of proper consorcios in order that the National Association could offer technical assistance to member "consorcios".⁴²

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

4. Support of Technological Development of Small and Medium Enterprises

- (1) Some special aspects of technological development of small and medium enterprises

40 INTERBRAS, Relatorio de Actividades 1977, Rio de Janeiro, 1978. Regarding trading companies in Brazil, we have referred to some unpublished informations of JETRO.

41 ECLA, "Export Promotion in Japan and its Application to Latin America", Economic Bulletin for Latin America, first half of 1970 and CEPAL, "Empresas de comercialización integrada del Japón", Comercio Exterior, Mexico, 1970.

42. As for "consorcios" see CEPAL, La Exportación de Manufacturas y la Política de Promoción, 1976.

As is well known, foreign advanced 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 to small and medium enterprises.⁴³ Furthermore, according to an ECLA 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."⁴⁴ 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."⁴⁵ Should this be the case there would be ample grounds for efforts in the development and diffusion of technology for the small industries.

We have already mentioned that technological progress was not introduced so intensively in small and medium enterprises as in large enterprises. As factors determining directly 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 of Latin America.⁴⁶

43 It is reported that large enterprises frequently complain about the low quality of products supplied by sub-contractors as well as delay of delivery of products sub-contracted. (PREALC, Análisis sobre el Proceso...). Complaints of foreign automobile industries operating in Latin America about the quality of parts and components produced by local sub-contractors are well known.

44 ECLA, Social and Economic Development and External Relations of Latin America, Santiago, 1977, p.183.

45 ECLA, op. cit., p.85.

46 As for this point an important observation was made by an expert mission sent to Venezuela for the cooperation with its government to promote small and medium enterprises: the level of technology of such processes which are typically adequate for small and medium industries was found to be less advanced such as forging and casting of iron and steel for instance. JICA, "Report on the Mission for Study on Preparation of the Plan for Promotion of Small and Medium Enterprises in Venezuela". (in Japanese) 1978.

- 2) Technical progress in such aspects that are indispensable for intensification of relationship 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 enterprises, including sub-contracting, public institutions for technical assistance, etc.

(2) Institutions for development of technology and technical assistance

In most Latin American countries, the importance of the technological development of small- and medium enterprises is gradually well recognized and different types of institutions are established to support it.

In Brazil the Special Program of Assistance for the Small and Medium National Enterprises give particular importance to the activities of CEBRAE. In accordance with the Program it was approved to give public finance to CEBRAE in order to duplicate its activities in the field of (a) studies and researches, (b) technical and management consultations and (c) training for management, through CEBRAES's 22 regional offices and the group of 650 experts.

In Mexico, the Program of Integral Support for Small and Medium Enterprises contains the Subprogram of technical assistance, in which participate different institutions related to the technological development, such as CONACYT (National Organization for Science and Technology), CENAPRO (National Center of Productivity), IMIT (Mexican Institute of Technological Investigations), etc. The fund for technical assistance would be channeled to these institutions through FONEP (National Fund for Preinvestment Studies).

In Japan, the technical assistance for small and medium 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 centers" throughout the country -- one in each prefecture. These centers were created to coordinate activities of existing institutions in the field of consultation and guidance of small and medium

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 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 seventies, there exist approximately 600 public local institutes for experiment and development of technology, that is more than seven times in number of the national institutes of technology. Number of researchers working there is one and half times as of national institutes, 30 to 50 persons for each institute, although the research expense is two thirds of the national institutes. Each prefecture has its own policy of technological development for local enterprises and accumulated very important experiences. For instance Nagano Prefecture took the initiative of promoting small and medium enterprises of precision industry with very high efficiency.

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

(3) Importance of interrelation between progress in institutional set-up and technological development

Technological development of small and medium enterprises is closely related with the changes in the institutional set-up for them. Their technological level-up is facilitated very much with appropriate institutions. For example, sub-contracting system permits the technological transfer from large enterprises to small enterprises, as is mentioned

later. Cooperation among small and medium enterprises through different kind of institutional arrangements, their association, for example, could have important implications on their technological development. If the members of association initiate the joint production, it would permit the introduction of more advanced machinery and equipment that cannot be used at the scale of the production of individual member companies. If, on the other hand, they agree on division of labour among member companies, they could specialize in certain process of production, introducing advanced technology and specialized machines. In certain industries such as machinery producing industry this aspect is particularly important.

Technical assistance from large sub-contracting firms to small sub-contractor firms constitute 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 sub-contractor firms were receiving technical assistance from sub-contracting firms. Although those sub-contractors that depend highly on one sub-contracting firm receive much technical assistance, 33.5% of those firms that depends less than 30% of their business on one sub-contracting firm were receiving technical assistance from sub-contracting firms. It is also very common that sub-contracting firms lend machinery or sell at low price second-hand machinery to sub-contractor firms. According to the same survey, 29.1% of the sub-contractors obtained machines from sub-contracting firms. It is needless to say that in addition to these assistances, sub-contracting firms give management guidance and financial assistance. According to the another survey conducted in the same year on sub-contracting firms, 86% of them sent specialist in technical assistance to their respective sub-contractors and 80% of them received trainees from sub-contractors. Furthermore, 24% of them gave patented industrial rights to their sub-contractors 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 and small-

medium 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 sub-contracting system in Chile the following points seem relevant:⁴⁷

- 1) Sub-contracting firms (large enterprises) do not have any explicit policy concerning sub-contracting and the percentage of components supplied by sub-contractors is low (less than 15%).
- 2) Sub-contractors (smaller firms) lack of means to show their capacity of production to sub-contracting enterprises in order to get contracts.
- 3) There is no technological transfer from large enterprises to sub-contractors, the only exception being the inspection of quality of products to be delivered to sub-contracting firms. It is not common that large enterprises help smaller ones for the production of sub-contracted components or materials.
- 4) Small enterprises do not have any adequate organization through which they can cooperate among themselves.

According to an article of ECLA, in Latin America sub-contracting is most developed in Argentina, Brazil and Mexico, particularly in motor-vehicle industry.⁴⁸ However, as we noted in the previous section, small and medium enterprises, particularly of machinery industries where sub-contracting system is very common failed to develop simultaneously with large enterprises.

Implication of cooperation of small and medium enterprises on their level-up of technology is also very important. As was mentioned before, some associations of these enterprises are doing their joint efforts in research and development area. Joint efforts are being made in both improvement and development of products, of their design, improvement

⁴⁷ PREALC, Análisis sobre el Proceso de Subcontratación en el Sector Línea Blanca en Chile, Santiago, Sept. 1978, p.8.

⁴⁸ ECLA, "Small Scale Industry in the Development of Latin America", Economic Bulletin for Latin America, Vol. XII, No. 1, p.82.

of technology or machinery for production process, etc. One of the important advantages of the joint efforts is that it is easier to get different kind 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 R and D projects got guidance from outside and 13% of them realized their project jointly with public institutes of technology (public laboratories) and 15% of them entrusted 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.⁴⁹ 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 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 sub-contractors, because they could diversify their sub-contracting firms instead of depending on one large sub-contracting company.

III. NEW FORM OF COOPERATION BETWEEN LATIN AMERICA AND JAPAN IN THE FIELD OF INDUSTRY AND TRADE

Having in mind analysis and findings obtained in the previous sections, we consider that the following constitute the main elements for the new

49 For the introduction of standard norms and quality control, national wide campaign was organized and voluntary groups called Quality Control Circles (QC Circles) were organized, and large number of workers participated in it.

forms of cooperation between Latin America and Japan.

1. General Principles and Priorities

The basic approach for the consideration of the new forms of cooperation is that such forms should fully take into account the industrial development strategy of Latin America at semi-industrialized phase, in particular its goals to be accomplished. As was discussed at the beginning of this Chapter, its four goals are not easy to be attained at the same time. Nevertheless the analysis of the previous sections appears to suggest its possibilities through appropriate policy measures that permit the introduction of technological and institutional innovations in manufacturing industry, especially of small and medium scale. These possibilities were discussed both from theoretical and practical point of view. It was suggested also that Japanese experiences could be useful for attainment of these goals. Therefore, in short, the cooperation between Latin America and Japan should be of such nature that it contributes effectively in the realization of industrial development strategy of Latin America, in particular, simultaneous accomplishment of the four goals.

It is needless to say that the specific areas that are most appropriate for cooperation with Japan should be different in each country. Such areas should be identified in accordance with each countries' priorities and with the capacity of Japan to cooperate effectively. Specific socio-economic conditions, availabilities of resources, etc., of each country should be fully taken into consideration. For instance, the development of such industry that elaborates the primary products could be important in some countries for its favorable effects on other industries. For example, capital goods producing sectors (particularly for energy development) in Mexico, processing of non-ferrous metals in Chile and Peru could be selected as the priority areas for cooperation with Japan. Concentrated efforts in these areas could probably contribute more effectively to the industrial development of each country.

2. Program of New Forms of Cooperation

In formulating program of cooperation for specific areas, it should be indispensable to stick to the following points:

- 1) Cooperation program should be elaborated and put into effect in collaboration with such institutions of Latin American countries that have experiences in specific areas.
- 2) Cooperation program should be of such nature that complement or support the policies and measures of respective countries for industrial development, export promotion, promotion for small and medium industries, etc.
- 3) Concerted efforts of different institutions of Japan (institutions which are in charge of financial cooperation, technical cooperation, mutual trade promotion, investment promotion, etc.) should be made towards specific areas of high priority.

In the field of technical cooperation, the program for specific areas identified as of high priority for cooperation with Japan should contemplate, among others:

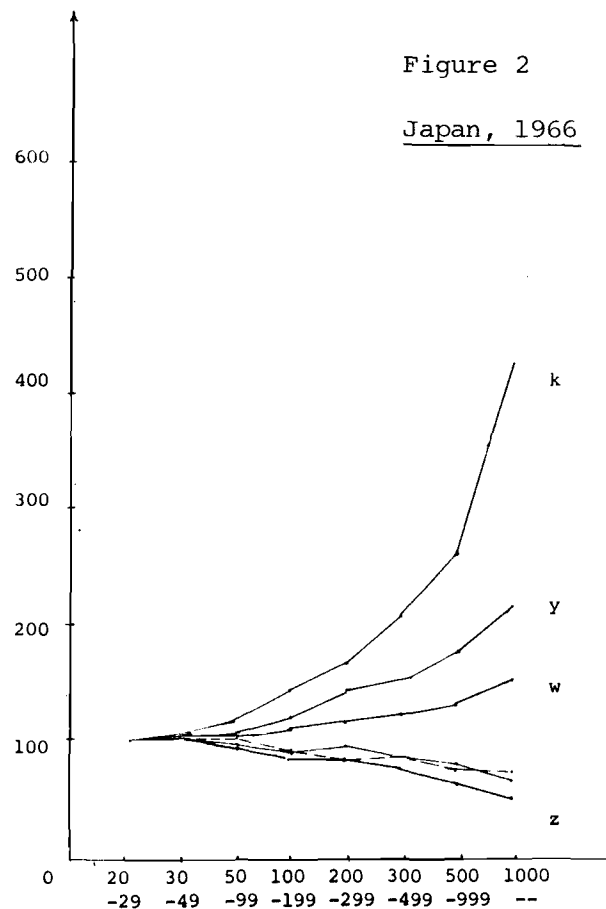
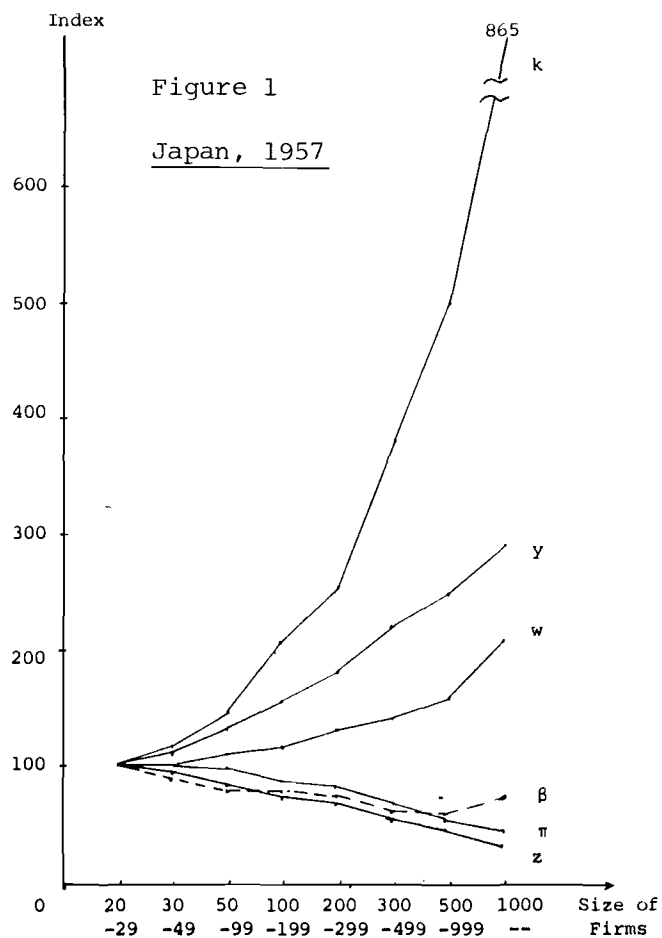
- 1) technical assistance to small and medium industries, particularly for such production processes that are most appropriate for these industries;
- 2) technical cooperation in such field that permits more intensive integration between enterprises of different size: standardization of industrial norms and specifications, quality control, etc.;
- 3) cooperation for the establishment of such institutional set-up that permits the technological progress of small and medium industries and the integration between them on the one hand, and large enterprises on the other, as well as expansion and diversification of export of manufactured goods, especially of small and medium industries;
- 4) training of engineers and workers in order to support the above-mentioned technical cooperation, particularly preparation of such specialized group of instructors who can make multiplier effects for technological progress, even after the cooperation program with Japan finishes.

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

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

Cooperation at private sector level could be also important. Co-operation or joint venture between small and medium enterprises of Latin America and Japan could be an interesting new formula and could be effective in introducing into Latin American small and medium enterprises, technology, organizational and management know-how as well as technique of exporting manufactures.

Figures 1 - 5 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)



(The number of employees per enterprise)

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

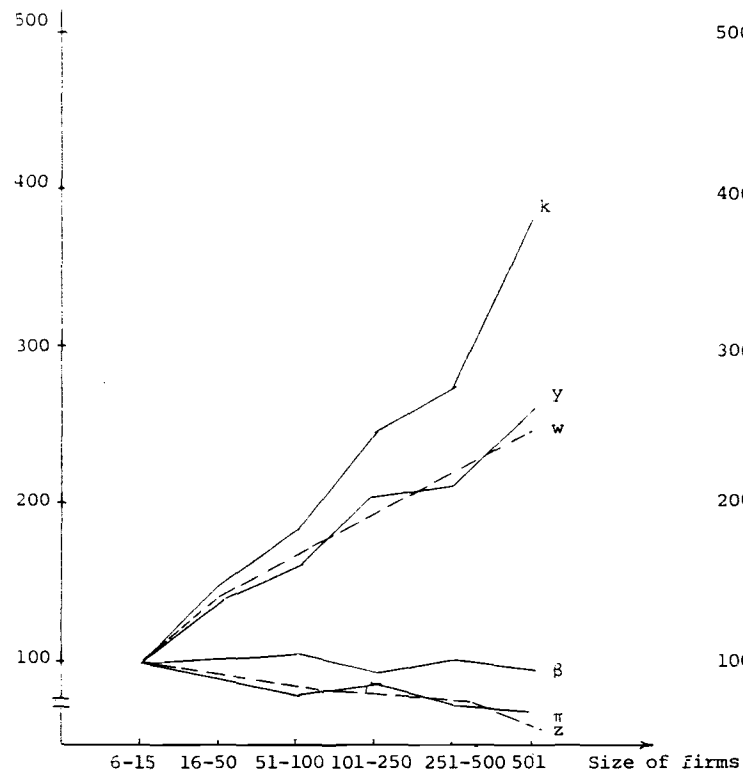
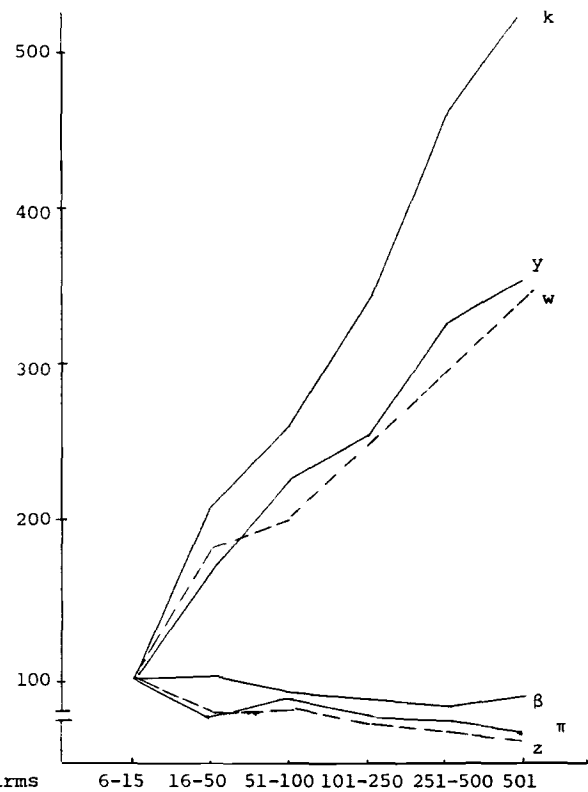
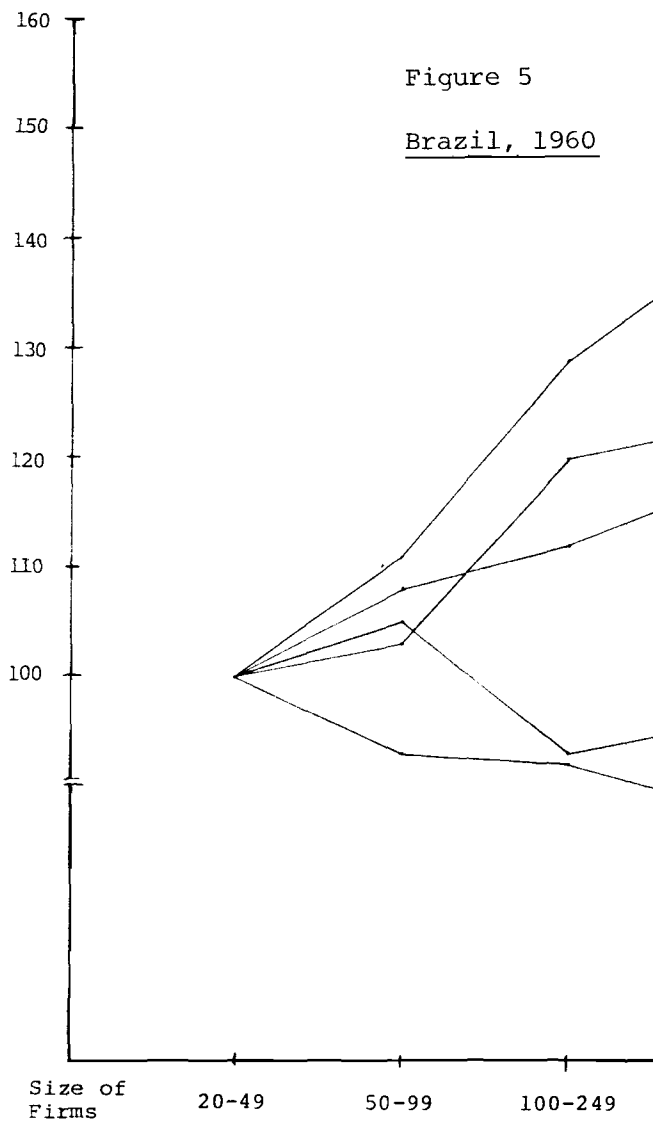


Figure 4

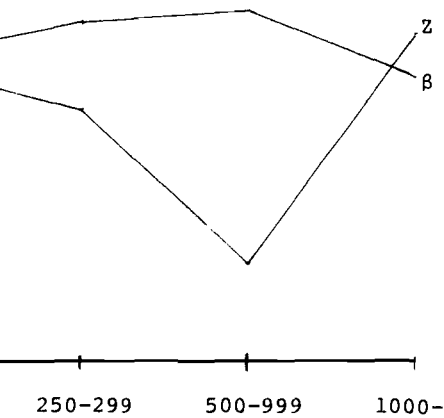
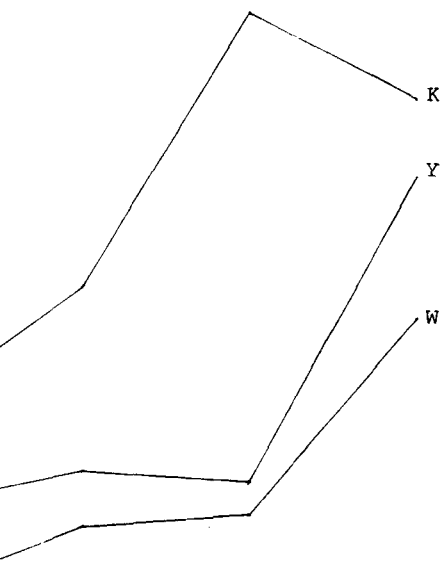
Mexico, 1975



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



Source: Industrial Census



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 Firms	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 Firms	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 Firms	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
1000 -	157	150	137	91	95

Source : Calculated from Industrial Census of Brazil.

AT.4 : Chile, 1967

Size of Firms	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 Firms	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 of page 74.

AT.6 : Peru, 1963

Size of Firms	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 of page 74.

AT.7 : Peru, 1973

Size of Firms	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 Firms	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 of page 74.

AT.9 : Colombia, 1973

Size of Firms	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

I. INTRODUCTION

Much attention has been paid to the rapidity of Japanese growth and several long-term models to explain the economic development of pre- and post-war Japan have been constructed (e.g. Economic Planning Agency [1], Klein [4], Klein and Shinkai [5], Ueno [10], and Ueno and Kinoshita [11]¹. In these models the entire industry is divided into two sectors²: 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 investigated systematically within the framework of macroeconomic 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 the "dualism" in Japan, they are closely related to the Ohkawa-Rosovsky framework which emphasizes the co-existence 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

1 See also Yoshihara [12], in which a systematic survey of these contributions is given.

2 In Ueno and Kinoshita [11], the manufacturing sector is subdivided into two subsectors: textile industry and heavy industry.

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 II 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 III. Results obtained are then used to test the role of indigenous sectors in a long-run dynamic context in Section IV. Finally a summary of the main results is given in Section V.

II. 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 the growth-theory literature which only distinguishes between capital and consumption 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 4-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]³.

As a preliminary, we have to make a convenient and useful grouping of industries. Among a number of possibility, we adopt a grouping by the scale distribution of labour employment, the share (percentage) to the industry total to classify three groups. A simple one by taking the small scale (1-49 workers) as the indicator is shown below.

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

This simple grouping may serve for our present purpose of identifying broadly the correspondence as 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]).

These results say 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.

3 The author is greatly indebted to Professors Kazushi Ohkawa and Shokichi Motai for their permission to use materials published in Ohkawa and Motai [7].

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

The basic time series used in this study were compiled by 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 behavior of capital intensity, K/L . These figures suggest 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.

III. 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 procedure⁴. 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	"	M1 (")
S2	"	M2 (")
SO	"	O (")
DA	domestic demand for sector	A (")
D1	"	M1 (")
D2	"	M2 (")
DO	"	O (")
X1	exports of sector	M1 (")
X2	"	M2 (")
IA	imports of primary products	(1965 prices)
I1	imports of indigenous manufacturing products	(1965 prices)
I2	imports of modern manufacturing products	(1965 prices)
$\Delta K1$	net investment in sector M1	(1965 prices)
$\Delta K2$	net investment in sector M2	(1965 prides)
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	

4 For investment functions endogenous variables affect other endogenous variables only with a time lag, and ordinary least squares is used to estimate these equations.

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.

(1) 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:

$$(\log S1 - \log N1) = 4.3841 + 0.2243 \{ \log(K1 + K1_{-1}) / 2 - \log N1 \}$$

(16.326) (2.955)

$$+ 0.02786 \text{ TIME}$$

(5.791)

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

$$(\log S2 - \log N2) = 3.1650 + 0.3744 \{ \log(K2 + K2_{-1}) / 2 - \log N2 \}$$

(2.385) (1.209)

$$+ 0.06452 \text{ TIME}$$

(2.845)

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

$$(\log S0 - \log N0) = 1.9860 + 0.4221 \{ \log(K0 + K0_{-1}) / 2 - \log N0 \}$$

(3.118) (3.707)

$$+ 0.04706 \text{ TIME}$$

(10.233)

$$\hat{\sigma} = 0.01728, \quad dw = 1.321$$

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 post-war 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 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.

(2) Domestic Demand Functions

Domestic demand for the non-primary sector is considered to be a function of personal disposable income, ratio of the implicit deflator for the sector's products to the 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:

$$\begin{aligned} \log DA = & 6.6738 + 0.4949 (\log YD - \log PC) - 0.1261 \log POA \\ & (40.423) \quad (8.479) \quad (1.304) \\ \hat{\sigma} = & 0.02063, \quad dw = 2.133 \end{aligned}$$

$$\begin{aligned} \log D1 = & 5.2044 + 0.5910 (\log YD - \log PC) + 0.1101 \log DK \\ & (24.938) \quad (7.154) \quad (3.319) \\ & - 0.9950 (\log POI - \log PC) \\ & (4.460) \\ \hat{\sigma} = & 0.01519, \quad dw = 2.796 \end{aligned}$$

$$\begin{aligned} \log D2 = & 2.0171 + 1.0961 (\log YD - \log PC) + 0.2825 \log DK \\ & (12.429) \quad (6.840) \quad (3.176) \\ \hat{\sigma} = & 0.04629, \quad dw = 2.499 \end{aligned}$$

$$\begin{aligned} \log DO = & 2.4195 + 1.0144 (\log YD - \log PC) + 0.0951 \log(DK + IG) \\ & (19.189) \quad (13.820) \quad (2.319) \\ & - 0.2671 (\log POO - \log PC) \\ \hat{\sigma} = & 0.01633, \quad dw = 2.215 . \end{aligned}$$

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 the demand for modern commodities was expected to outstrip the other groups with rising incomes. 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.

(3) 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:

$$\begin{aligned} \Delta K1 = & 0.2050 S1_{-1} + 0.7580 \Delta K1_{-1} - 6.5215 IN \\ & (4.358) \quad (6.867) \quad (2.690) \\ \hat{\sigma} = & 28.794, \quad dw = 2.030 \end{aligned}$$

$$\begin{aligned} \Delta K2 = & 0.1929 S2_{-1} + 0.7491 \Delta K2_{-1} \\ & (4.449) \quad (7.242) \\ \hat{\sigma} = & 196.067, \quad dw = 2.180 \end{aligned}$$

$$\begin{aligned} \Delta KO = & 0.7148 SO_{-1} + 0.8086 \Delta KO_{-1} \\ & (2.328) \quad (6.109) \\ \hat{\sigma} = & 79.229, \quad dw = 2.848 . \end{aligned}$$

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 seems 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 dropped from the equations.

(4) Import Functions

The import functions were made functions of the levels of the domestic demand for the sector, implicit price deflators for imports and domestic prices. As for the 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 include 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 leave 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 1% change of domestic demand are 1.070 for indigenous manufacturing products and 0.949 for modern manufacturing products⁵. Although these estimates are not statistically different from one, 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 made Japan succeed in escaping from this trap.

(5) Export Functions

Exports of manufacturing products are assumed to be functions of 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 by the industry classification which is comparable with ours; therefore, 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:

$$\log X_1 = 5.0642 + 1.9053 \log TWMR - 2.8690 (\log PO_1 - \log PEIW)$$

(3.035) (4.425) (2.370)

$$\hat{\sigma} = 0.10443, \quad dw = 0.935$$

$$\log X_2 = 0.1596 + 1.4020 \log TWMR - 0.6162 (\log PO_2 - \log PEIW)$$

(0.161) (4.033) (8.460)

$$+ 0.3134 \log X_{2-1}$$

(2.233)

$$\hat{\sigma} = 0.02734, \quad dw = 2.750$$

⁵ As for indigenous manufacturing goods, the short-run income elasticity of imports is simply 0.2899, while the long-run elasticity is $0.2899 / (1 - 0.7290) = 1.070$.

If we put $X_2 = X_{2,-1}$ 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.

(6) 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:

$$\log PO_1 = 2.6073 + 0.2676 \log W_1 + 0.0910 \log PI$$

$$(7.561) \quad (24.364) \quad (1.391)$$

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

$$\log PO_2 = 3.2342 + 0.0434 \log W_2 + 0.2403 \log PIM$$

$$(11.353) \quad (2.856) \quad (5.036)$$

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

$$\log PO_0 = 2.5527 + 0.2642 \log W_0 + 0.0815 \log PIM$$

$$(9.185) \quad (17.381) \quad (1.778)$$

$$\hat{\sigma} = 0.01839, \quad dw = 1.215$$

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.

(7) 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:

$$\begin{aligned} \log W1 - \log W1_{-1} &= 0.03222 + 0.9277(\log PC - \log PC_{-1}) + 0.05306 \frac{1}{Q} \\ &\quad (2.611) \quad (2.704) \quad (1.927) \\ \hat{\sigma} &= 0.01978, \quad dw = 1.895 \end{aligned}$$

$$\begin{aligned} \log W2 - \log W2_{-1} &= 0.04298 + 0.5834(\log PC - \log PC_{-1}) + 0.03826 \frac{1}{Q} \\ &\quad (3.077) \quad (1.503) \quad (1.228) \\ \hat{\sigma} &= 0.02239, \quad dw = 2.479 \end{aligned}$$

$$\begin{aligned} \log WO - \log WO_{-1} &= 0.03658 + 0.8262(\log PC - \log PC_{-1}) + 0.03577 \frac{1}{Q} \\ &\quad (3.114) \quad (2.530) \quad (1.365) \\ \hat{\sigma} &= 0.01883, \quad dw = 1.665 . \end{aligned}$$

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.

Technical Equations

$$\begin{aligned} \log Q &= - 0.7186 - 16.466 \frac{N - NL}{NL} \\ &\quad (4.249) \quad (8.793) \\ \hat{\sigma} &= 0.2212, \quad dw = 0.808 \end{aligned}$$

$$\log YD = - 5.6286 + 0.4647 \log V + 0.5154 \log V_{-1}$$

$$(22.648) \quad (2.064) \quad (2.236)$$

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

$$\log PC = - 1.8188 + 0.4376 \log P + 0.9549 \log PP$$

$$(7.742) \quad (2.416) \quad (6.037)$$

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

Market Equilibrium Conditions

$$DA = SA + IA - XA$$

$$D1 = S1 + I1 - X1$$

$$D2 = S2 + I2 - X2$$

$$DO = SO .$$

Identities

$$K1 = K1_{-1} + \Delta K1$$

$$K2 = K2_{-1} + \Delta K2$$

$$KO = KO_{-1} + \Delta KO$$

$$S = SA + S1 + S2 + SO + SR$$

$$P = (POA*SA + PO1*S1 + PO2*S2 + POO*SO + POR*SR) / S$$

$$N = NA + N1 + N2 + NO + NR$$

$$\Delta K = \Delta KA + \Delta K1 + \Delta K2 + \Delta KO + \Delta KR .$$

IV. 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 associated with annual systems, there has been no problem in obtaining convergence and the simulated series seem to reproduce the general behavior 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 perform 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 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 N_2 to N_1 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 the more rapid growth of labour supply results in the more slowly growing S_2/S_1 and N_2/N_1 . Similarly the more rapid growth in world manufacturing exports leads to more rapid growth in the labour demand, which in turn results in greater increases in S_2/S_1 and N_2/N_1 . 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 S_2/S_1 for the first and third experiments results in a decrease in PO_2/PO_1 (Table 3-7), which might promote the import substitution with respect to modern manufacturing products (the secondary import substitution), the imports of modern manufacturing products grows faster for the first and third experiments than for the second and the fourth (Table 3-10). This is because more rapid growth of modern manufacturing sector leads to 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 for 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 cause the 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 was much 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 is 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.

V. 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 the import substitution with respect to modern manufacturing products. Thus, as stated in Section II, 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 in the main that have 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 center 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 face 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 of 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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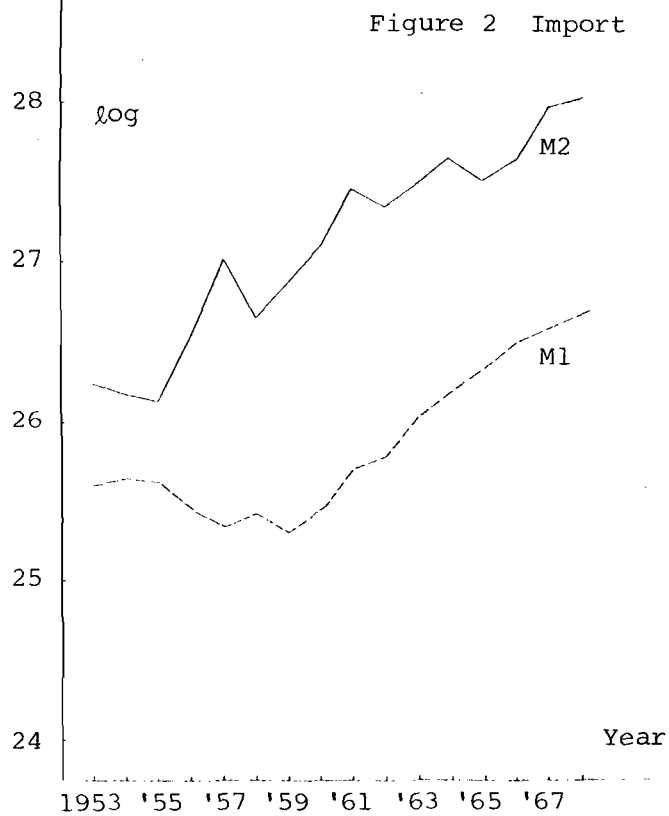
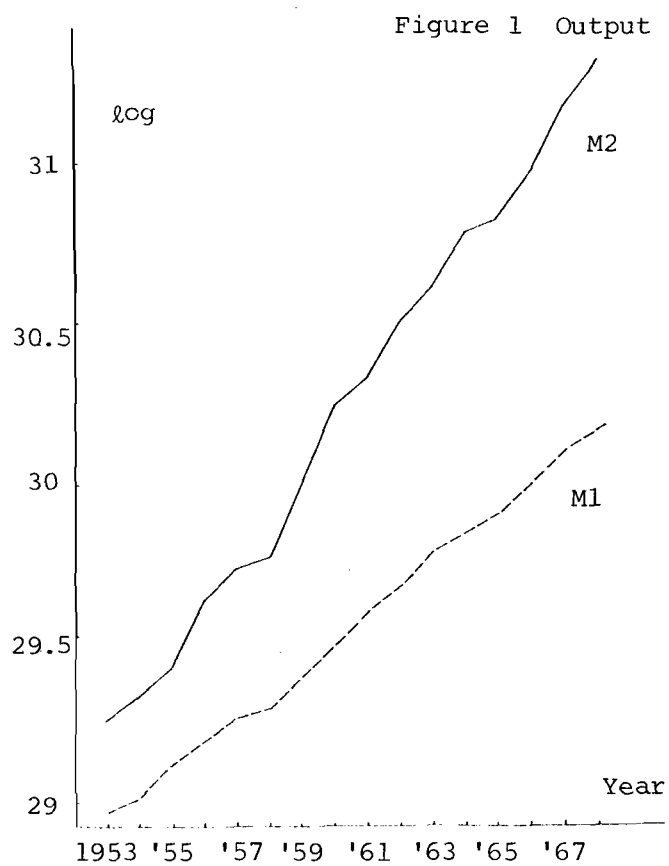
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Table 1 Distribution of Workers by Size of Employees, by Three Groups¹

		(%)											
Industry and Class	Number of Workers	I	II	III	IV	V	I + II + III + IV + V	VI	VII	VIII	IX	X	XI
		1	4	10	20	30		50	100	200	300	500	1000
		2	2	2	2	2		2	2	2	2	2	2
		3	9	19	29	49		99	199	299	499	999	
Group A: ²													
Wood and wood product		6.1	18.6	22.7	12.2	12.7	72.3	11.6	6.2	2.7	1.9	2.7	2.6
Furnitures		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: ³													
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: ⁴													
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

- Notes :
- 1 Three groups have been established on the basis of the amount of aggregates of percentage of workers engaged (column (5)) within the selected industries whose number of workers engaged range from 1 to 49.
 - 2 Amount of the aggregate is more than 50% of the industry.
 - 3 Amount of the aggregate falls 30-40% of the industry.
 - 4 Amount of the aggregate is less than 29% of the industry.



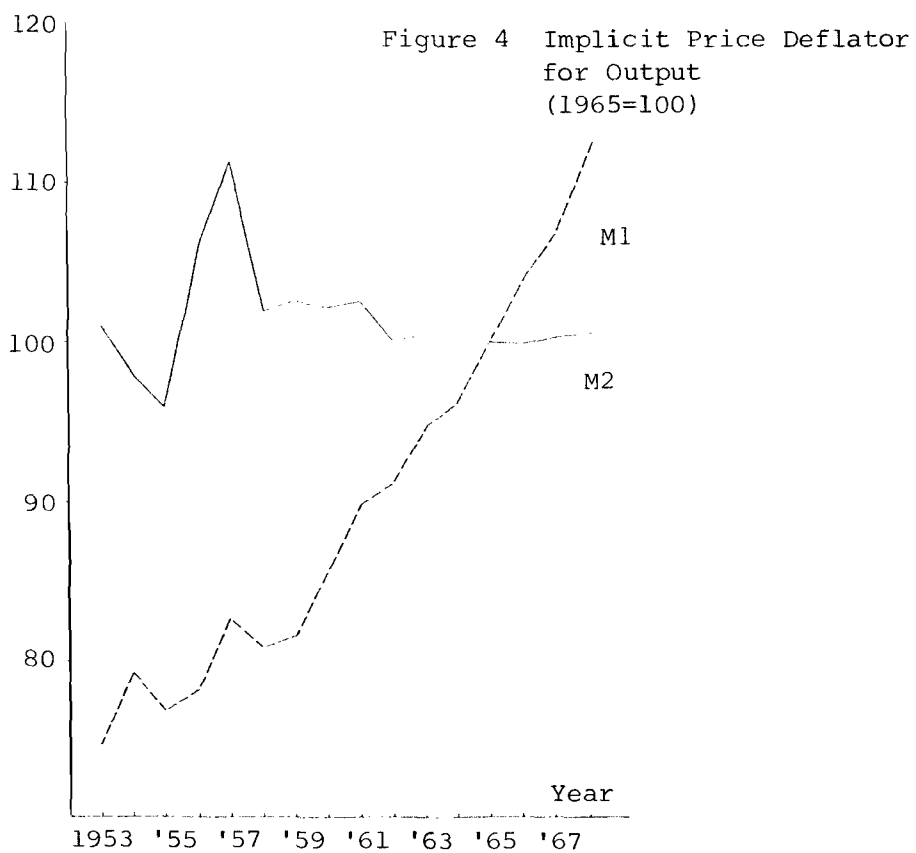
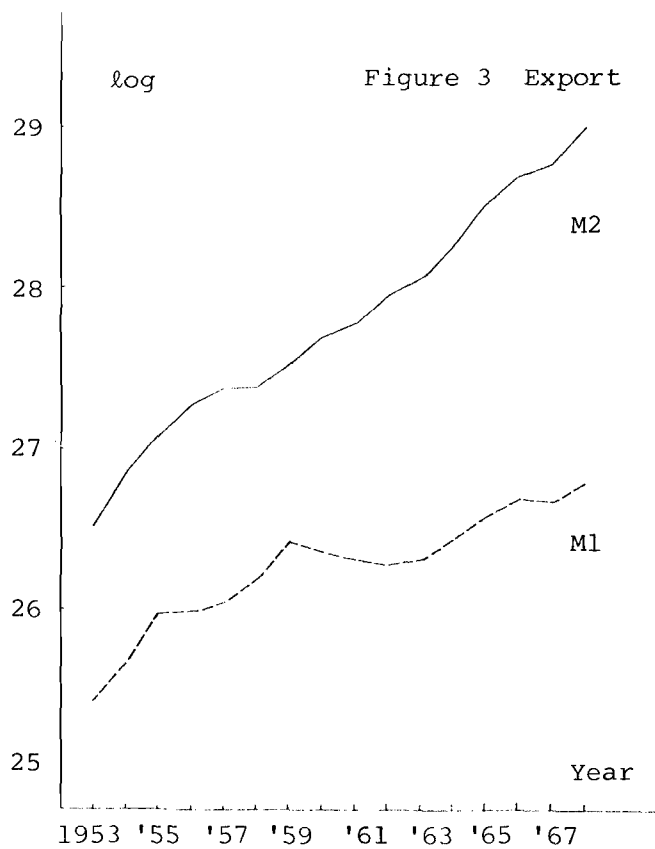


Figure 5 K/L

(Unit: 10 thousand yen, person)

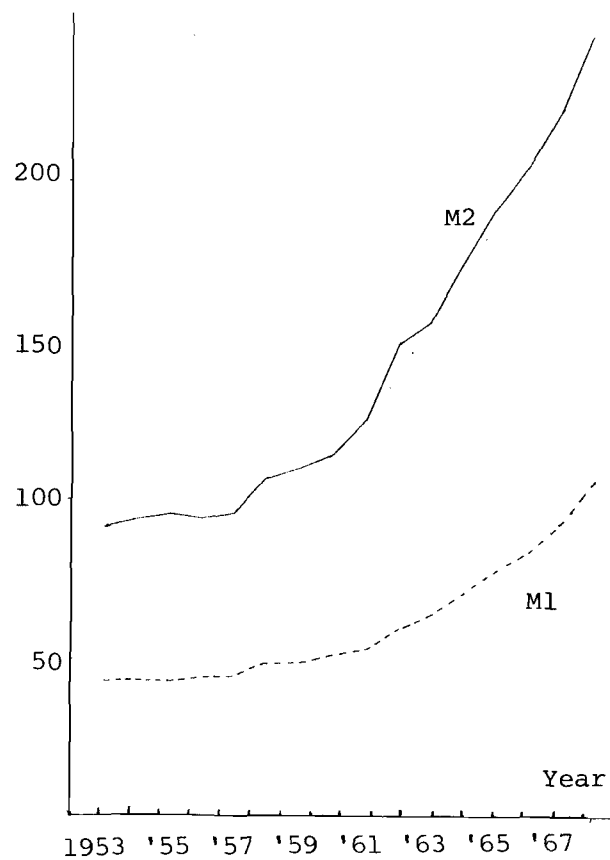


Table 2 Values of Endogenous Variables

	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	10191.0	2528.3
1960	27.369	59.922	24.441	4851.86	6269.21	13216.0	2902.0
1961	29.074	64.810	26.203	5119.03	7068.31	16247.3	3319.9
1962	30.569	67.898	27.287	5159.77	7666.10	17112.6	3679.3
1963	32.923	70.834	28.401	5295.76	8588.34	19179.0	4131.2
1964	33.535	72.929	30.205	5521.56	9153.34	22630.4	4578.3
1965	34.229	74.060	31.086	5664.20	9658.98	22987.6	5009.3
1966	35.505	75.078	31.691	5926.70	10614.0	26403.5	5569.7
1967	35.979	77.470	32.783	6337.20	11802.6	32805.3	6327.2
1968	36.779	80.580	33.440	6556.96	12604.7	37827.0	7074.6

	$\Delta K1$	$\Delta K2$	ΔKO	X1	X2	IA	I1
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	60.4	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

	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

	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

	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	1008.20
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	1057.20
1957	1086.8	4803.7	6774.8	30873.6	84.06	386.262	1515.40
1958	1174.7	5326.2	7245.9	31868.2	80.07	387.247	1627.20
1959	1245.5	5884.5	7783.9	36427.9	82.41	392.938	1568.40
1960	1384.5	6827.1	8557.5	42575.2	85.94	408.395	2801.20
1961	1536.5	8092.2	9378.6	48869.5	90.51	421.210	3312.40
1962	1798.2	9560.6	10347.1	53063.4	91.82	433.634	4061.30
1963	2074.5	10994.7	11405.5	58543.5	94.60	444.965	4181.10
1964	2367.0	12709.9	12667.0	66575.3	97.25	450.929	5152.10
1965	2656.7	14154.0	13912.3	70568.1	100.00	454.117	4743.00
1966	2962.1	15378.0	15324.5	78538.2	103.19	463.215	5005.50
1967	3348.6	17224.9	16769.4	89717.2	106.06	473.079	6036.90
1968	3888.3	19943.3	18470.1	101609.	108.45	483.330	7587.30

Table 3-1 Simulation Results (S2/S1)

	Actual Values	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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	Experiment 2	Experiment 3	Experiment 4	Experiment 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 Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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 Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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 Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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:W0]/W1)

	Actual Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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 Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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 Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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 Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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 Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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 Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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 Value	Historical Simulation	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 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

CHAPTER 3 MINERALS TRADE AND ECONOMIC COOPERATION: THE CASE OF IRON ORE

I. 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 geographic distance, 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 resources policies.

The economic relations between Latin America and Japan in the realm of mining have a special feature which cannot be found in other fields. The mining industry in Latin America generally has a strong international competitiveness, and minerals 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 nor scope for the elements of economic cooperation to be introduced in mining since the 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 the 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 minerals import policies that enable these countries to maximize the contribution of the mining sector to the development of their economies. And without its conscious efforts in this direction Japan cannot hope for the stable minerals imports. In other words, the elements of economic cooperation have become needed on top of the 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, focussing on the iron ore trade between Latin America and Japan so as to avoid diffusion in the argument, we explore the desirable forms of economic cooperation in minerals trade in the years to come. By comparing Japanese experience in Latin America with that in Australia, it will be argued that a new form of economic cooperation is possible with technological-cum-institutional innovation in iron ore mining and trade.

Iron ore is relatively abundantly endowed in the world and its overall supply constraint is less acute than those of petroleum and nonferrous minerals. Moreover, since iron ore mines have been developed mainly by private hands, their development has been rare to be discussed in relation to economic cooperation. But iron ore is much more important than nonferrous minerals. Japan's import of iron ore is more than twenty times in quantity terms, and five times in value terms, that of nonferrous minerals; and similarly important it is for the exporting countries. Its significance is greater still when the impacts on 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 give the sufficient reason why the problems related to iron ore are discussed here.

II. THE PROSPECT FOR IRON ORE TRADE

In the twenty-year period from 1950 through 1970, the world steel production tripled. 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 the war destruction--then became the promoter of the world iron ore trade by extending its principal import sources from the neighboring small- and medium-scale mines of Southeast Asia to remote, large-scale mines of Australia and South America (see Table 1).

Table 1 Japan's Import Sources of Iron Ore,
Selected Years ('000 wet tons, per cent)

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

Source: Japan Iron and Steel Federation, Tekkō Tōkei Yōran, 1972 & 1979.

Note: Figures in brackets are percentages of total.

In case of Brazil, it is the remotest supply source of iron ore to Japan. But the disadvantage of long haulage is lessened by the triangular shipping arrangement utilizing the 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, whereby increasing the hold usage and economizing freight costs. Up until 1974 when the increase of the petroleum price made the long distance voyage costlier, the c.i.f. price of the Brazilian ore was in fact the cheapest in Japan (see Table 2).

Table 2 Japan's Iron Ore Import Price (c.i.f.)

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.

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

First, the dissatisfaction is expressed by the exporting countries to the fact that the gains from the rapid export expansion of iron ore of the 1960's had disappeared. Furthermore, with the upsurge of resource nationalism, iron-ore exporting countries demand more of the gains derived from the trade to be accrued to them. Their insistence on the increase of the iron-ore export price and local processing before export for higher value added exemplifies this tendency.

Second, the demand for iron ore is not independent of its supply. In a situation such as at present that the world iron-ore demand is stagnant and the condition of market oversupply prevalent, the expansion of the existing mines and the development of the new mines fall away, while the existing reserves are depleted. When the demand for iron ore should revive after five or ten years of slump, a serious ore shortage may emerge since the expansion of existing mines normally require a five-year, and the development of new mines a ten-year, gestation period.

Third, more than half of the Japanese iron ore need in 1985 has already been provisioned by the long-term ore purchase arrangements and the rest is expected to be fulfilled by the renewal of the going contracts without difficulty (see Table 3). When the short-supply situation described above is in sight, 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 in serious doubt. In such a situation, the required amount of iron ore may not be served.

Table 3 Forecasts of Japan's Iron Ore Import Demand
(1980 and 1985)

	('000 tons)	
	1980	1985
(1) Crude Steel Production	120,000-127,000	135,000-150,000
(2) Iron Ore to be 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 & 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 & Southeast Asia	2,660	1,880

Sources: (1)-(3): Kaiji Sangyō Kenkyūjo, Kaigai Shigen to Kaijō Yūsō ni Kansuru Kenkyū Chōsa (II) (Research Report on Overseas Resources and Shipping II), March 1978.

(4): Tex Report, Yūnyū Tekkōseki Nenkan (Yearbook of Iron Ore Imports), 1978.

Japan must continue the practice of the long-term ore purchase contracts as well as the expansion of the existing mines and the development of the new mines abroad so as to be free from the adverse impacts of the 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 neighboring newly industrializing countries in Asia in order to guarantee its own long-term, stable ore supply. The import demand of these countries has already reached nearly one fifth of the 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.

III. 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 1950's, it has become the most efficient in the world--comparable in scale to that of EEC--by the introduction of new technologies and large-scale equipments. At the same time, the acquisition of the materials inputs has become one of the most important tasks of the Japanese steel industry. Its huge demand for iron ore could not be satisfied by the 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 the mines located in the opposite side of the globe. Japan did not have international mining companies nor its steel companies had capacity to develop captive mines abroad. Under these circumstances, Japan devised its unique strategies for iron ore import: collective ore purchase arrangements by major steel producers and trading firms, and the long-term ore purchase contracts.

The collective ore purchase arrangements originate in the founding of the Overseas Steelmaking Materials Committee. Faced with the increases in the f.o.b. 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 Kōkan) formed the Committee which was later joined by the other four major steel producers. The Committee provided these seven steel companies a place for policy coordination and collective action for the acquisition of the materials inputs abroad. Composed of the president, the vice president, and the executive general manager in charge of materials

imports of each member company, it carried out not only the researches 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 necessary preparations 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 the Japan's current import contracts of iron ore. Note that it includes only important contracts and those of the small- and medium-scale mines in India, Africa, etc. are not listed. Due to the incompleteness of the data used, not all the items in the table have the same level of accuracy. 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.

There are three methods that Japan makes use of for its iron ore import: (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.

According to the production-sharing method, Japan finances for the development and expansion of iron ore mines abroad and/or the improvement of loading facilities of the host country, and receives the 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 differ whether Japan's equity participation takes place. The extent of Japan's equity participation also differs widely from a low level of 5-10% to a high of nearly 50%. The long-term contracts are normally of the duration of 10 to 15 years with the price and quantities of the ore predetermined. The distinction between (A), (B), and (C) are not so clearcut since (B) and (C) may accompany the finance of mining development.

Table 4 Japan's Iron-Ore Import Through the Long-Term Contracts and Equity Participation

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 = million 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 mt III. 1969~78 total 15 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 mt III. 1969~78 total 37.5 mt V. 1970~80 total 60 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 & 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	
4. Robe River (Western Australia, 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 mt Pellet 1972~93 total 86.7 mt ±10% option, price determined by the brick system	

5. Savage River (Western Australia, Australia)	Pickands Mather & Co. (operator)	(J) Dahlia Mining (Mitsui-Sumitomo) 50% equity evenly divided from the start (M, L) Northwest Iron Co. (PMI, U.S. & Australian capital) 50%		1968~87	total 45 mt	Ore price of Dahlia determined annually based on actual production cost; ore price of Northwest determined by Japanese pellet import price
			* Mitsubishi & Sumitomo → steel mills (6)			
6. Rio Doce (Minas Gerais, Brazil)	Cia Vale do Rio Doce (CVRD)	(L) Brazilian Government	None	I. 1966~80	total 50 mt	
			* Nissho Iwai - steel mills (7)	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 mt	
				VI. 1979~93	total 85 mt	
						±10% option, price determined by the brick system
7. NIBRASCO (Espírito Santo, Brazil)	NIBRASCO Pellet production 6 million tons per year All the pellet feed supplied by CRVD (1978/5~)	%50 million (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%)	1978~92	6 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
			* Nissho Iwai - steel mills (6)			
8. MBR (Minas Gerais, Brazil)	Mineracoes Brasileiras Reunidas Ore sold by CAEMI in areas other than Japan	1.5 billion Cr. [CA 61% (Japanese group 20%) \$8.16 million investment by steel mills (6) and trading companies (4)		1973~88 1977~	total 150 mt brick system	±10% quantity option
Aguas 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 & Mitsui - steel mills (6)			

- | | | | |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------|
| 9. SAMARCO
(Minas Gerais,
Brazil) | SAMARCO
Utah International
(shipper) | (L) Samitri
(M) Utah
International | 51%
49% |
| 10. Marcona
(Peru) | Hierro Peru (public
corporation)

Minapeco (shipper)
10 mt/yr (6.5 mt at present) | (L) Peruvian Government | |
| 11. Algarrobo
Boqueron-
chanal
(Chile) | (L) Compania Del Pacifico | (L) Chilean Government | |
| 12. Romeral
(Chile) | El Romeral Mine
Pacific Ores & Trading B.V.
(shipper) | Compania de Acero del
Pacifico, S.A.
(CAP 55%,
Inter. Muller. 45%) | |
| 13. Bailadila
(India) | MMTC: Minerals & Metals
Trading Corporation of
India (shipper) | | |

None	1977~86	4.8 mt
* Mitsubishi & Nissho Iwai - Kobe Seiko	±10% option, price linked to that of CVRD	
None	Seven-year contract (1976~83) made separately by six Japanese mills (totalled to 2 million tons in 1979). Pellet and pellet feed. Prices adjusted every year to prices quoted for fine ores from Brazil and Australia.	
* Mitsui, Marubeni, Nissho Iwai → steel mills (6)		
US\$85 million loan for the construction of pellet plant to CAP by Mitsubishi, which will be repaid in pellet for 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.	1978~87	total 32.2 mt
* Mitsubishi - steel mills (5)		
None	1979/4~80/3	2 year total 5 mt
* Mitsubishi - steel mills (4)	±10% mill option, price determined each year	
None	1971~79	total 61.3 mt
* Okura Shoji - steel mills (8)	±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 laons from the 8 Japanese mills (US\$15 million). Loan repain in kind of pellet for 5 years (Product Sharing System). \$2.15 per ton. * Okura Shoji & Mitsubishi - steel mills (6)	1979~90	total 18.3 mt
15. Iscor (Republic of South Africa) (Sishen Mine)	South African Iron.& Steel Industrial Corp. Sishen-Salhdanha Railway		None * Mitsui, Mitsubish, 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 mt
					±10% option, price revised every five years + annual price damange (within ±20%)

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 coordinating trading companies only;
(3) mt signifies million tons.

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

Normally seven major steel companies of Japan 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 are ten or so major Japanese trading firms as the import agents. Once the contract is signed, the rest is a 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 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 case of new mining ventures, the bulk purchase guarantee by the long-term contract of the Japanese steel mills can be a collateral to a large sum of fund 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 behavior is motivated by risk aversion as well as profits sharing.

2. Merits and Demerits of the Long-Term Contracts

A majority of the Japanese iron ore trade in the near future will be conducted as in the past through the long-term contracts, for they satisfy the needs of both the sellers and the buyers of iron ore and bring in the stability in the transaction in the long run. But they cannot cope with the oversupply or shortage of iron ore due to the cyclical fluctuations. In the latter half of the 1970's, the Japanese steel producers tried to deal with the decrease in iron ore demand and

the situation of oversupply by introducing such flexibilities in the execution of the long-term contracts as 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 a great deal of dissatisfaction to the export side. Moreover, it may result in the changes in the nature of the long-term contracts in a direction to jeopardize the long run stable supply of iron ore to Japan. It is, thus, desirable to retain the merits of the fixed price and the fixed quantity of the long-term contracts, and to take measures against the cyclical fluctuations. Since the function of a buffer stock or stockpiling is limited in iron ore, macroeconomic adjustment policies that mitigate international transmission of cyclical fluctuations should be called into use.

On the other hand, there exists the problem whether the long-term contracts alone are sufficient to guarantee the necessary amount of iron ore supply to Japan when the supply shortage should emerge or when the interruption of ore supply should take place by the flood or the strike in an exporting country. One measure against these situations is Japan's equity participation in mining development and operations to make sure that the terms of contracts are to be 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 thus far is only nominal. At the same time, there are cases in which host countries themselves ask for Japan's equity participation, rather than the production sharing or plain long-term contract.

Another measure against the supply shortage or stoppage is the geographical diversification of supply sources. In the 1960's Japan had already diversified its import sources of iron ore (see Table 1). But this was simply the result of the efforts to import as much iron ore as possible. Conscious efforts for diversification was made in the 1970's 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.

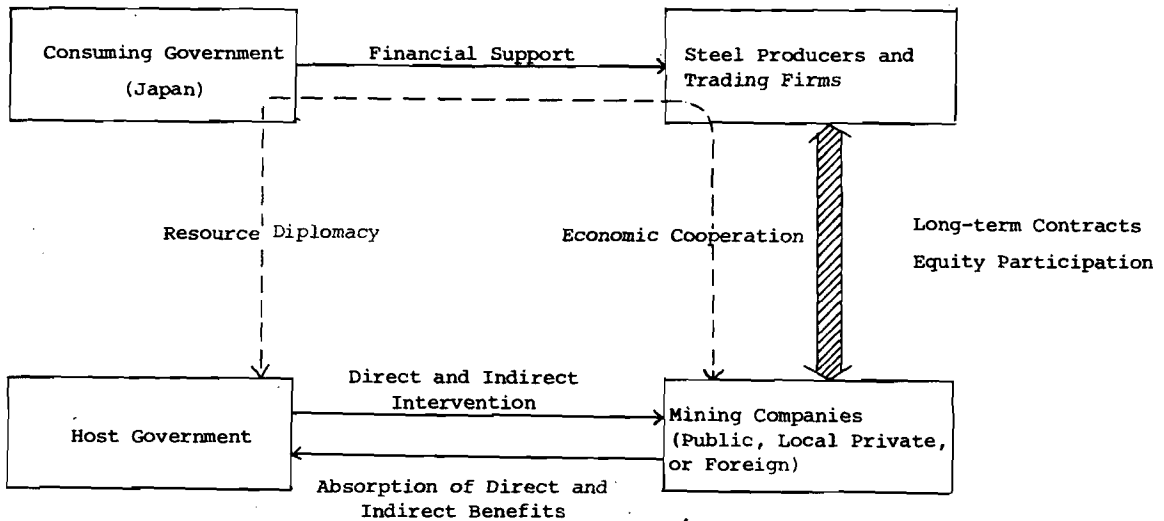
3. The Elements of Economic Cooperation

Traditionally economic cooperation has been considered humanitarian in its intent and to be separated from trade which is essentially based on the profit motives. A new phenomenon increasingly noticeable in Japan is a tendency to incorporate a variety of economic cooperation into minerals trade. For instance, much of Japan's economic cooperation 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 cooperation are as yet not many in the case of iron ore, directly related to its mining and trade is the construction of pelletizing plants and port and loading facilities in the exporting countries, and indirectly related are the construction of steel plants and the contribution to the regional development programs. Most of these activities are of course not profitable in themselves. We may deduce the implications from this new phenomenon.

In mining development and trade of iron ore, the following four agents are generally distinguishable (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. In other minerals, too, these four agents are ascertainable, but their relationship will be different.

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

Figure 1 The Relationship Between the Consuming and Host Countries in Iron Ore Mining and Trade



Note that there are two aspects in this relationship. Each party tries to turn the terms of trade in its country's favor over the other by making use of its bargaining power as much as possible. At the same time, they collaborate to realize the long-term, dynamic benefits--beneficial to both parties. These two aspects seem to explain the aforementioned events--the flexible executions of the long-term contracts and the increase of iron ore price in the oversupply situation 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 motive to mutually increase long-term benefits by their siding with the mining companies.

One of the tendencies that become apparent in the 1970's is the increase of the direct intervention of the host governments with the activities of the mining companies by the name of resource sovereignty. Chile (1971-73), 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 to their favor. 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 collections and through various regulations.

To cope with this tendency of the host governments, the governments of the consuming countries are expected to play a more active role. Since the ore import activities of the Japanese steel producers bring benefits to the Japanese economy as a whole, the Japanese government has financially supported the procurement of materials inputs by the steel producers. But the active involvements of the host governments made the Japanese government to strengthen its activity in minerals trade in two ways. One is its incorporation of the elements of economic cooperation in minerals trade in support of the ore procurement activities of the steel producers. Another is its efforts to create a better environment for minerals trade and developmental investment by its directly working upon the host governments. By so doing, interruptions of mining development and minerals trade so often happened in the past in the events of nationalization and other forms of a intervention by the host governments can be prevented. This amounts to what is called resource diplomacy.

IV. IRON ORE MINING AND DEVELOPMENT POTENTIALS

In this section, we shall examine in what ways the host countries have realized what kind of benefits from iron ore mining and related activities.¹ Special attention will be given as to how Japan has been involved in the developments to consider in the next section the desirable forms of Japan's economic cooperation with Latin America in iron ore mining.

1 Much of the background information in this section on Latin American iron ore mining was furnished by the study Ferromineria en America Latina prepared for the present study by Ing. Fernando Agirre Tupper.

1. Private vs Public Enterprises in Iron Ore Mining

In 1979 Japan imported 130.3 million tons of iron ore amounting to U.S. 2,999.3 million dollars. The import of this huge magnitude 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 in 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 offered 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 1966.² Japan is the most important importer of Australian iron ore and, conversely, Australia is the most important supply source of iron ore to Japan. Rice 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 check the terms of export contracts and collect 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--is part of the mine development projects.³ With the concession fees and other government revenues, it

2 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), ch.4.

3 The relationship between the Federal government and the Western Australian state government in matters of iron mine development is analyzed in detail in Garth Stevenson, Mineral Resources and Australian Federalism (Canberra: Australian National University, 1976).

Figure 2 Iron-Ore Mining by Private Enterprise

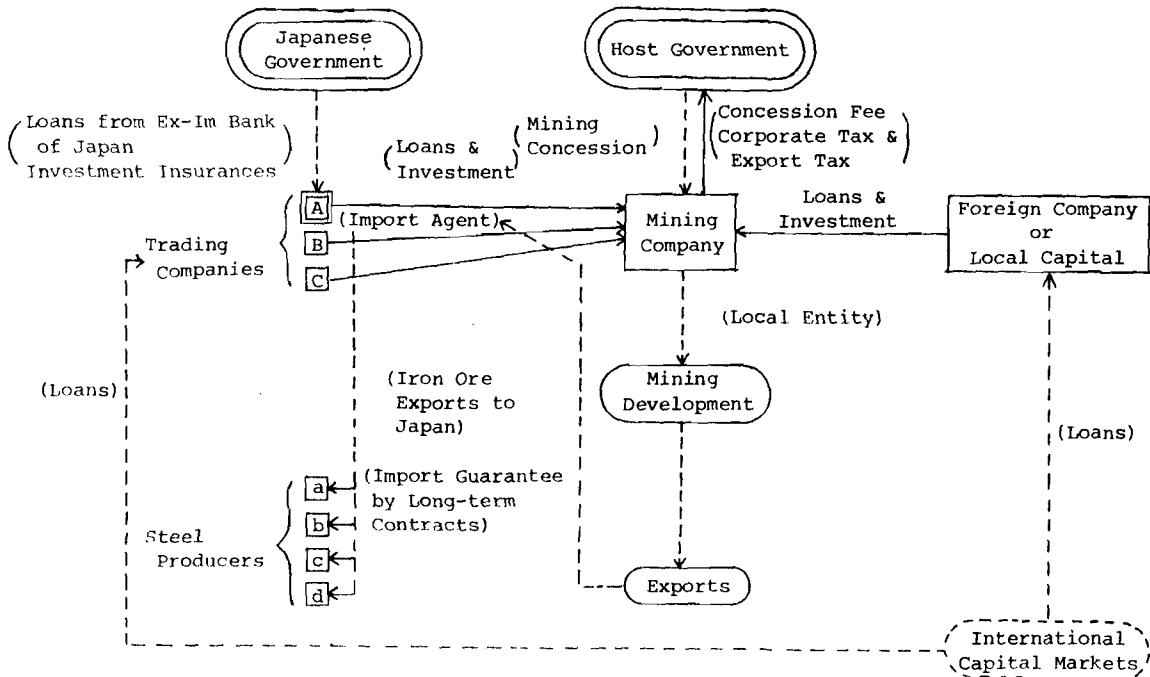
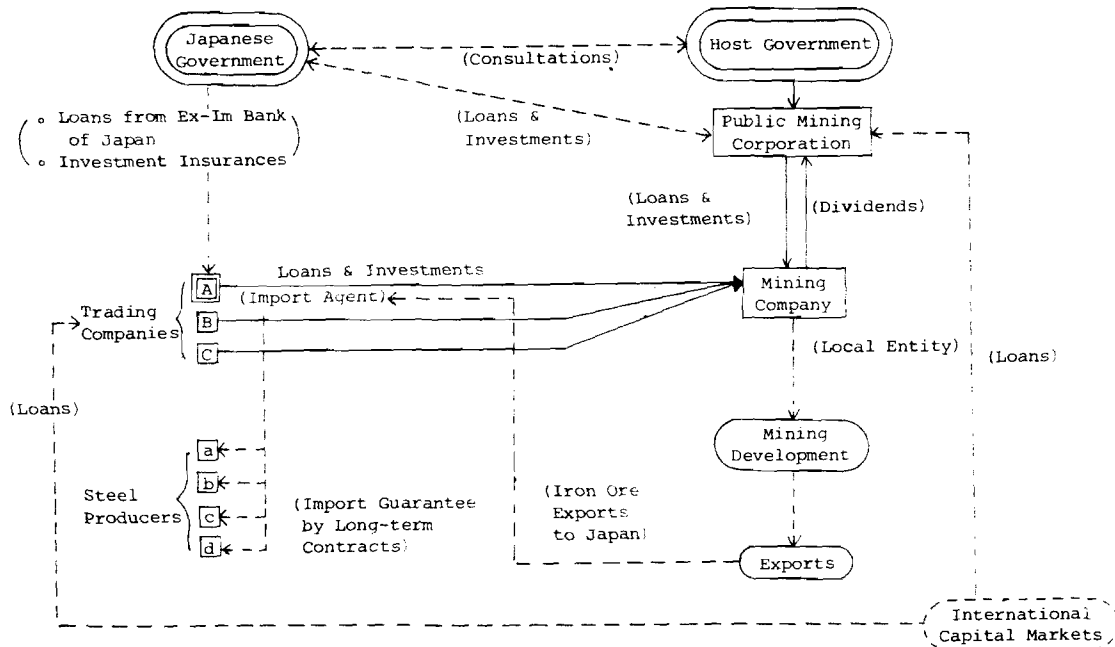


Figure 3 Iron-Ore Mining by Public Corporation



is making an integrated regional and industrial development program of the Pilbara district including the construction of steel industries.⁴

In this way, in a country like Australia where its 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.

Turning to the second most important supply source of iron ore to 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 (Minerações Brasileiras Reunidas) and the SAMARCO have developed iron ore mines jointly with foreign enterprises.⁵ On the other hand, a public corporation CVRD (Cia. Vale do Rio Doce) has been engaged in iron mine development, mining operation, ore transport and export.

To jointly develop the Capanema mine in Minas Gerais, the CVRD established the 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 is scheduled in October, 1980.⁶ One of the advantages in 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 case of a public enterprise like the CVRD,

4 Government of Western Australia, Department of Development and Decentralisation, The Pilbara: A Development Concept (1973).

5 An interesting account of the MBR is given by Raymond F. Mikesell, "Iron Ore in Brazil: The Experience of the Hanna Mining Company," in Raymond F. Mikesell and others, Foreign Investment in the Petroleum and Mineral Industries: Case Studies of Investor-Host Country Relations (Baltimore: Johns Hopkins Press, 1971), pp. 345-364.

6 Iron Ore Manual, 1979 (Tokyo: TEX Report, 1979), pp. 65-66.

however, it is possible to borrow necessary developmental funds at a lower interest rate with the backing of the government, and then invest or finance it to its joint venture, whereby reducing the burden of interest payments. Since the interests are an important item in ore production costs, this advantage is indeed important.

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 as the joint ventures with Italy (ITABRASCO with capacity three million tons per year), with Spain (HISPANOBRAS with a capacity of three million tons per annum), and with Japan (NIBRASCO, six million tons in its two plants).⁷ The CVRD plans the development of the Carajas mines in the state of Para as well to make them the pole of the regional development of the underdeveloped area of Brazil's Northeast.⁸

Thus far, by taking mines in Australia and Brazil for their respective example, 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, develop a captive mine, and obtain iron ore from it. Since most of this type of mines were nationalized by the governments of the host countries, captive mines in the true sense of the term rarely exist today.⁹

7 Ibid., pp. 237-239

8 Cf. "Interim Report of the Preliminary Study on the Regional Development of the Carajas Corridor," (provisional) (International Development Center of Japan, December, 1979).

9 Most of what are called captive mines nowadays really are joint ventures with the local capital. See, for example, Iron Ore Manual, 1979, p. 32

Nationalization implies the change of ownership of an iron mine from the private to the public hands. Frictions often arise in its 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 dies away, it does not differ from the mine 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 take part in the development of iron ore mines only indirectly, the contribution of the mining activities to the development of the economy is traditionally realized through the siphoning off of the government revenues from mining to other branches of the economy. But in these countries, the government intervention with 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, the development strategies of these countries will differ. Accordingly, Japan's economic cooperation in iron mine development may take different forms. But even if the partner of an iron mine development is the host country government, the Japanese government cannot go out to deal with it. Directly involved are always the Japanese private enterprises. When the partner is a state enterprise, there may be apprehension as to the continuity of its policy. But intergovernmental coordination is needed whether the partner is a state or private enterprise. The coordination is required especially in matters relating to the 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 mine development and ore exports is the income to be created by digging untapped iron ore resources. Part of the income accrues directly to the host government as government revenues. Since part or most of ores mined are exported, the host country earns foreign exchanges (see Table 5).

Table 5 Benefits from Iron Mine Development

<u>Direct Benefits</u>	<u>Indirect Benefits</u>
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

There are three, closely related aspects in utilizing the direct benefits mentioned above to the economic development of the host country. The first aspect is how to find out economically exploitable iron ore reserves, actually develop mines, and transport ore to its markets to create income. Many host countries do not have capabilities to find ore deposits and evaluate their economic feasibility for mining by themselves. They lack a large sum of capital, technology, and managerial skills to develop and operate mines as well as marketing abilities. In iron mine development and ore exports, these countries, thus, have to relay 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 regard and endeavored 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 is concerned with the problem of how to use the direct benefits thus acquired to the development of the economies of iron ore producing countries.

During the 1950's and 1960's when the 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 to have become seriously considered in the 1970's when the world iron ore demand stagnated and oil crises and worldwide recession adversely affected their economies.

The transition to the stagnant growth period produced new problems, too. One of them is the adjustment of ore production to demand fluctuations under the stagnant growth, and another is the problem of inducing the indirect benefits from iron ore mining to further the 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 here the latter problem.

In addition to the direct benefits, many iron ore producing countries are, therefore, presently trying to induce indirect benefits from iron mine development and ore exports which are external to their economies.¹⁰ One of the indirect benefits is the forward linkage effect (see Table 5). Included in this effect are the inducement 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.

For the iron ore producing countries, it is a natural disposition 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 ore is exported as it is mined. Although ore processing is much more capital intensive than mining operation pe se, the increase

10 This implies that, in addition to the comparison of the 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.

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 in an enclave of modern industries.

At the same time, imports of processed ore have advantages for the consuming countries, too, as compared with ore import before processing. (c) The import of processed ores with high Fe content reduces transport costs. This is especially important when ores are imported by the long-distance maritime transport which requires a good deal of heavy oil whose price is rapidly increasing. (d) Ore importing countries can save energies and electricity needed for processing. This makes especially attractive the local processing of iron ore in a country or area which abounds in energy resources. (e) Import of processed ore prevents from 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.

But, for an iron ore mining enterprise, and especially for a multinational enterprise which can locate its processing plant either in the consuming country or the producing country, the following factors work against local processing before export: (f) the competition with the existing processing plants in the consuming countries, (g) the lack of infrastructure and external economies for local processing which are readily available in the consuming countries, and (h) the risk of default of the principal and interests from investment in processing equipments in the developing countries.¹¹

11 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).

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

The 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 to be 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 the U.S. steelmakers for the Canadian ore whose iron content has decreased.

Pellets have a good reducibility in blast furnaces and easy to transport. But their price is about 70% higher than that of fine ores.¹² Iron ore pelletizing was welcomed in the developing countries. In the 1970's 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.

A large amount of oversupply of pellets is expected to emerge since the latter half of the 1970's because of the increase in pelletizing costs due to the increase in petroleum prices and the preference of the Japanese and European steel producers to cheaper sinters. Many pelletizing projects are now suspended and, of the operating pelletizing plants, some have already closed down.¹³ Given the present situation,

12 In 1979 the f.o.b. price of fine ores (Fe 64%) of the CVRD destined to Europe was 23.9 cents per Fe unit on the average, while the price of oxide pellets was 40.23 cents per Fe unit (see Iron Ore Manual, 1979, pp. 24-25).

13 Mt. Klahoya (Ivory Coast), Putu (Liberia), and Klukwan (Canada) are the examples of iron ore pelletizing projects for the moment suspended in which development Japan was asked to participate in the 1970's.

it is true that the advantages offered for the Japanese steel producers by pellet imports is not great. But the disposition of iron ore, producing countries to the exports of 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 deteriorate in the future, pelletizing seems to be an inevitable consequence as was seen in the experience of the U.S. steel producers. Where cheap natural gas is abundantly available, pellets can be produced in 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 the 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 high polluters, while environmental regulations are getting strict in industrialized countries. Recently, a new technique was developed which enabled long-distance maritime transportation of sinter. Thus, in lieu of pellets exports, the promotion of sinter exports seems to be one promising direction.¹⁴
 - 3) In addition to the preparation and processing of iron ore, the exports of semi-manufactured products of pig iron and crude steel are another direction of local processing before exports. 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 consuming countries ((c), (d), and (e) above) are also to be realized, 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 to ore processing, as well as

14 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 coming 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.

greater fixed investments in plants 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. But, 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 readjustment 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 favorable 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.¹⁵ However, in those countries where iron mines are located near to 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 Quadrilátero Ferrífero area in Minas Gerais. In addition, virtually all the materials inputs necessary for steelmaking except coking coal and petroleum can be supplied domestically. Thus, as Table 6 shows, Brazil's steel production has rapidly surpassed

15 For example, Australia's rich iron ore reserves are found in the Northwest of the continent, while its population is concentrated on the Southeast.

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.

Table 6 Production of Crude Steel in Brazil and Australia

	(Million 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.

Japan's economic cooperation in Brazilian steel production started in the late 1950's 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 annual production capacity 3 million tons). Also noteworthy is the joint pelletizing project (Cia. Nipo-Brasileira 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 in coking coal, its integrated steel mill with annual production capacity 120 thousand tons has been designed to use charcoal made from the trunks of aged rubber trees which are abundantly available locally.¹⁶ As is clear from the example of the Malayawata, not only Brazil but also other

¹⁶ 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 Cooperation, 1978).

Latin American countries could similarly reap the indirect benefits from iron ore mining development and exports when Japan's economic cooperation efforts find their proper outlets based on the technological-cum-institutional innovation. In Algeria, Argentina, China, Mexico, Venezuela, and other iron ore producing countries, Japanese steel makers have already been promoting technological cooperation 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 data, since the heavy demands for equipment of the iron ore mining industry have largely been met by imports. While this may be expected to change somewhat, except for 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 affects favorably not only the mining site and its surrounding area but also the areas where railroad and port facilities are constructed. An iron mine is often situated in a sparsely populated, underdeveloped area and it has a potentiality to 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 ores 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 the population of 1.56 million in 1976.¹⁷ This clearly demonstrates amplified multiplier effects of iron mine development. Taking the remarkable

17 See, for example, Industrial Development Institute of Minas Gerais, Economic Information on Minas Gerais, Brazil (1977).

development of Minas Gerais as the 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.¹⁸

In Australia, too, a similar, large-scale integrated regional development project is contemplated in the Pilbara district as stated above.¹⁹

Thanks to the 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, Copiapo, and Caldera have developed around the Coquimbo and Atacama mines in the past twenty years. In Peru, the city of San Juan has developed to have 20,000 inhabitants as the loading port of 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 the regional development from iron ore mining has been centered around the mining and loading activities. But, by the introduction of the processing of iron ore into fines, pellets, slurry, etc., their 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 from iron ore mining activities itself can be significant depending on natural as well as socio-economic conditions. For example, both Mt. Newman iron

18 See "Interim Report of the Preliminary Study on the Regional Development of the Carajas Corridor."

19 See The Pilbara: A Development Concept.

mine in Australia and Itabira mine in Brazil are the largest iron mines in the world, each producing 30 million tons or so of high grade ores annually. Both are open-pit mines and adopt most advanced mining equipments 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 1960's 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 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 not offered 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 is the company employees. Most of them are single male workers newly arrived from southern Europe and live in a life style of self-service. 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 a high income class have house 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 offer an example that we cannot categorically say that the employment creation effect in iron ore mining is small.²⁰

20 The discussion above is based on the observations by the present authors of the visits to these two mines.

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 favorable locational factors--must operate efficiently with the use of modern technology so as to be an export industry with international competitiveness. So long as mining activities are confined to the iron ore mining and closely related sectors of the economy by forming 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 argument above, the benefits the host countries derived in the past from iron ore mining and exports are centered on the direct benefits, and the indirect benefits have not been significant. In the 1980's, however, iron ore producing countries will promote iron ore mining and exports in such a way that they enhance the indirect benefits above discussed. 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 like Brazil in which socio-economic conditions are favorable, it is possible to promote its economic development 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, if fragmentally, the role that Japan has played to amplify the indirect benefits. We shall not consider the various possibilities of Japan's economic cooperation in iron ore mining in the final section.

V. IRON MINE DEVELOPMENT, IRON ORE TRADE, AND ECONOMIC COOPERATION

For the importing countries, economic cooperation in minerals trade signifies to help the efforts of the exporting countries to enhance the benefits from resources development and trade. The greater the benefits, stronger will be the motive of these countries to maintain harmonious

relations in minerals trade with the importing countries. This, in turn, will contribute to the secure access to minerals supply on the import side.

Economic cooperation 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 cooperation does not directly lead to the reduction in iron ore production costs, it will give the incentive for cooperation to the importing country 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 give incentives for economic cooperation to the private mining ventures because of the presence of large external economies. The case in point is 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 cooperation in iron ore mining is concerned. In fact the 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 cooperation, 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 governments' propulsion. But in case external effects are significant on the part of 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, on the part 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 cooperation 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 cooperation needed and the stronger the aspects of external effects in the host country, the larger will be the impacts 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 cooperation in iron ore mining may be considered stage by stage.

- 1) As the existing mines are exploited, promising iron ore reserves must be searched and new mines developed. In many underdeveloped regions of the world, basic geological surveys are not yet conducted. Iron ore is likely to be abundantly endowed in developing countries, and it brings benefits to the world as a whole to find out these iron ore reserves and to develop iron mines.

Developing countries do not have sufficient technologies to conduct basic geological surveys. Only advanced countries have these abilities. For their use, however, sufficient understanding between the governments is required with the upsurge of resource nationalism. The general basic geological research essentially belongs to the realm of economic cooperation to be promoted on an intergovernmental basis for it does not directly relate to the profit motives.

In Japan, the institutional arrangement in this area is well established. To the Japanese firms which conduct an exploratory study on overseas mineral resource development (general survey) and a feasibility study (specific survey), subsidies (one half to two thirds of the necessary fund) and low interest loans (to less than one half of the required capital, their repayment

in ten to twenty years with 3.5-6.5% of interest rates) are supplied by the Metal Ore Exploration Promotion Agency (for developed countries) and the Overseas Economic Cooperation Fund (for developing countries). The promotion of pertinent geological research projects is awaited.²¹

- 2) The development of new iron mines and the expansion of the existing mines require a large sum of capital and technology. In Latin America as a whole, fixed investments in iron ore mining and steel industries amounted to U.S. 2,600 million dollars in 1977. Of this amount, 14% was financed from the own-funds of the enterprises concerned, 53% from the 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 fund is, thus, obtained in the international financial markets. At the same time, the Japanese steelmakers and trading companies are often asked to invest in or finance the projects since they are big 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 cooperation 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 6-9% and repayments in 5 to 10 years).

The public development corporations in developing countries frequently have sufficient technologies on iron mine development and operations. The technological level of the CVRD of Brazil, for instance, is one of the highest in the world. When

21 See Sueo Sekiguchi, Japanese Direct Foreign Investment (London & Basingstoke: Macmillan Press, 1979), ch. 2.

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 the overseas sales of iron ore, the CVRD is the experienced marketer. Public export corporations of developing countries which were established along with the public mining corporations are often efficient and competitive internationally. For the Japanese trading companies, there is not much room to enter the sales of 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 difficulties in finance as well as 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) The practice of the long-term contracts is currently in the mainstream of iron ore trade. However, it is necessary to incorporate in it 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 run stability in 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 benefits 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 case of iron ore, intergovernmental macroeconomic policy adjustments

are needed in the problem of transmission of business fluctuations from the iron ore importing to exporting countries.

- 4) The scope for economic cooperation 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. Of these mines, however, there are those which would become sufficiently competitive with large-scale mines because of the closer location to the markets, better ore quality and so forth once such bottle-necks 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 potentiality 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 bottle-necks do not seem to exist in this respect.

In addition, it is necessary to continue the efforts for technological-cum-institutional innovation on marine transportation of iron ore. In the 1960's 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.²²

- 5) Regional development based on iron mine development is the field in which economic cooperation of the iron ore importing countries is most anxiously looked forward. Iron ore mining is a large-scale enterprise and requires the construction of a railroad system and port facilities for the transport of iron

22 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.

ore. Moreover, it has significant indirect effects in that it induces ore processing, steelmaking, and processing of steel products. It is, thus, often placed in the center of a broad regional development program as was the case in the Pilbara district of Western Australia or the Carajas mines in Brazil. Developmental effects of such a regional development program is not confined to iron mine development and iron ore trade, and a wide range of economic cooperation 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 the 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 in finance and investment guarantees. The institutional framework of this practice is well established in Japan and is sometimes called the "Asahan scheme."²³

- 6) The possibility of iron ore exports in processed forms was discussed in detail in the previous section. Presently, the world market condition is unfavorable to pelletizing. However, this form of ore processing is not easy to give up for those countries which cannot have integrated steel plants due to the smallness of their domestic market and other limitations. By the development of alternative ore processing techniques and in combination with the entry resource development, the competitiveness of local processing before export must be strengthened. There is another field in which technological development is wanted. There are mines which are left aside because their ores contain impurities such as sulphur and phosphorus as the

23 Terutomo Ozawa maintained that this scheme was the Japan's new resource diplomacy of the 1970's by calling it the "government-backed group investment." But as discussed in section III, the collective ore purchase arrangements with the backing of government finance started in the 1950's 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).

environmental regulations become strict. 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 assistance from many countries in the construction and operation of steel plants. The Malayawata Steel and the USIMINAS discussed in the last section are the prominent success cases. Technological cooperation in steelmaking is in progress in Algeria, Argentina, China, Mexico, Venezuela, and other countries. It is underscored that, because of the deferred payments on the exports of steelmaking equipments 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 cooperation. Competition with the existing steel mills in industrialized countries may cause the problem. However, as many future projections indicate, the expansion of steel production capacity in developing countries is an inevitable course. Rather than curving the trend, the readjustment of industrial structures must be promoted actively. In its orientation as well as in the arrangement for its favorable environment, the role of the governments is not small.

Finally, before concluding the present paper, the relationship between the private sector and the government in Japan's economic cooperation in iron ore mining must be discussed. As was analyzed in section III, the 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 by the government finance.

Ever since the overall supply constraint on natural resources was recognized in Japan around 1970, various measures for secure access to resources supply have been advocated in the White Papers on International Trade and other government publications. The White Paper on Resources 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 nonferrous metals, and iron ore and coking coal seemed still to be left to the private sector.

It must be noticed, however, that the 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 minerals import finance supplied by the Overseas Economic Cooperation 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 resources development and it has given an important support to foreign investment in general by private enterprises. 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 resources trade policies expressed in the White Papers on International Trade, etc., are understood to indicate the direction of the flow of the government finance. Even if iron mine development has been promoted in the hands of the private business groups, therefore, the role that the government has played in Japan's iron ore imports is significant.

A new element in the minerals trade policy which appeared in the recent the White Papers on International Trade is the promotion of economic cooperation to resource-endowed countries. Although this seems to be principally directed at petroleum and nonferrous minerals, it is also applicable to iron ore for the reasons already stated above. But it does not merely mean the increase of financial support of the Japanese government to the activities in the private sector in iron mine development investment and iron ore trade. Even the expenditures on economic cooperation must be spent efficiently subject to the budget constraint. 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 center 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 cooperation in iron ore mining discussed above, those closely related to the direct benefits of specific mining enterprises and specific steelmakers should be left to the private sector. The governments of both the importing and host countries should concentrate on activities which have large external economic effects. In other words, high priorities 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 the 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 by Japan's economic cooperation. As examined here as to iron ore, the incorporation of the elements of economic cooperation into minerals development and trade will have the effects of promoting the development of resource-endowed countries. The possible areas of cooperation were indicated in (1) - (7) of the

present section and the relationship between the government and the private sector in Japan's economic cooperation was probed in the concluding part of this section.

CHAPTER 4 NEW AGRICULTURAL DEVELOPMENT IN LATIN AMERICA AND JAPAN'S COOPERATION

Latin America is a region where land is abundant relative to population and is expected to have the largest potentials of development of new agricultural land for food production compared with other regions of the world. On the contrary, Japan is a small country and is one of the largest importers of food and feed grains of the world. So far, she depends the imports of foods and feeds heavily on the United States, but she is trying to diversify her supplying countries, particularly to 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. The chapter aims at examining possibilities to expand agricultural production and export of Latin American countries to meet the increasing demands for several products which Japan imports large quantities from the world market. In this connection, this chapter will also explore possibilities of effective technical cooperation 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 a big possibility to increase agricultural production and exports not only by expansion of cultivated land area, but also by increase in yield per hectare using modern technology in some of the Latin American countries. If appropriate policies are taken in relation to Latin America's comparative advantages in the world market, Latin America can increase its agricultural output significantly since the land is extensively used and some of large farms still employ the traditional production technology.
- 2) Since the demands for some exported crops in the exporting countries would increase with the increase in per capita income,

demands and supply conditions of such crops in exporting countries have to be carefully examined.

- 3) Since land is distributed unequally among farms in many of Latin American countries, the polarization of land holding between large and small farms would become more serious if appropriate policies would not be taken for small farmers. This is not only applicable to the small countries, but also to the large exporting countries, since the latter countries also have the same problems in some of the regions in the countries.

Considering the above three points, this chapter would reveal the problems to be resolved and find possible economic and technical cooperation between Latin American countries and Japan for resolving these problems.

I. DEMAND AND SUPPLY CONDITIONS OF CEREALS AND SOYBEAN IN LATIN AMERICA AND JAPAN

1. Changes in Demand for Food in Latin America

Though many Latin American countries are exporting cereals, the deficits were averaged 2 million metric tons during the 1972-74 period if countries of the region taken as a whole. During the 1975-77 period, both production and consumption in this region were around 83 million tons, and the production just met the consumption. However, the net imports of cereals in 1975 and 1976 were around 3.5 million tons and 10 million tons respectively, and the exports exceeded the imports by 0.43 million tons only in 1977.

Among cereals, demands for wheat and rice as foods are growing, while those of maize and sorghum are decreasing in recent years. However, demands for maize and sorghum as feeds are increasing, because of increases in demand for eggs, poultry meat and pork. Demand for soybean is also increasing, mainly because of the increase in demand for edible oil. In Brazil, production of soybean has increased enormously, however, the export of soybean grain has not increased parallelly because of the

increase in domestic demand for edible oils. Since the beginning of the 1970s, soybean production in Brazil has increased at the expense of maize production because soybean 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 the maize export in that year. On the contrary, the export of soybean has increased from 213 thousand tons to around 1.8 million tons during the same period.¹

In Mexico, production of maize exceeded consumption during the 1961-65 period. The same condition continued until 1972 except in 1970.² Since 1973, Mexico has become maize importing country which imported nearly 1.7 million tons of maize in 1974. In the case of wheat, the condition is quite different. Until 1966, the country imported wheat, but succeeded to increase the production and became an exporting country during the 1967-70 period. Since 1971, she became an importing country again, though an increase in production continued. This can be shown by the fact that annual wheat consumption per capita increased from around 34 kg in the 1961-65 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 Cultural Economico of the Banco de Mexico,³ 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

1 International Development Center of Japan, "Possibility of Development of Oil Bearing Crops in Brazil, Malaysia and Nigeria," in Mikai Hatsu Chiiki Norin Shigen Kaihatsu Sogo Kiso Chosa, (Basic Survey on Development of Agriculture and Forestry Resources), Tokyo, 1975, pp.128-31.

2 International Development Center of Japan, "Mexico and Pakistan," in Mikai Hatsu Chiiki Norin Shigen Kaihatsu Sogo Kiso Chosa, (Basic Survey on Development of Agriculture and Forestry Resources), Tokyo, 1977, pp.132-3.

3 Fondo de Cultura Economica, "Funciones Consumo y Coeficientes de Elasticidad Ingreso," La Distribucion del Ingreso en Mexico, Series VII, 1968.

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 feedstuffs in future would be very high. Without the study which analyzes a change in 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

(1) Projection for Japan

According to the projection of supply and demand for foods prepared by the Japanese Government in 1975,⁴ the imports of coarse grains and soybean in 1985 are shown in Table 1.

Table 1 Imports of Selected Cereals and Soybean

	(1,000 tons)	
	1972 (Actual)	1985 (Projected)
Wheat	5,088	5,346
Maize and Sorghum	10,367	16,114
Soybean (Grain)	3,369	4,580

Source: Long-term Projection of Food, Ministry of Agriculture and Forestry, 1975.

The projection was made based on the 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 soybean would be raised. Since production is still exceeding consumption in the case of rice, it is assumed that the acreage allotment to reduce rice production would continue until 1985.

⁴ Ministry of Agriculture and Forestry, Shokuryo Jukyu no Chōkimitōshi, (Long-term Projection of Demand and Supply for Food), Tokyo, 1975.

The import requirements shown in the above table were estimated on the basis of the demand and supply projections by commodity. In the case of wheat, production will increase by 5.3% per annum, while the 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-sufficient rate of wheat in 1972 was 5% and that in 1985 is estimated as 9%.

For 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) during the 1972-85 period, while the supply including imports was projected to increase by 3.4% per annum. The demand for meats including poultry meat was projected to increase from 14.2 kg per capita per annum in 1972 to 18.6 kg in 1985 or totally by 3.1% per annum, while production was projected to increase by 3.6% per annum during the same period. The imports of meats except beef were estimated to decrease, but the beef import was 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 million tons. The import requirement of feed stuffs in terms of actual volume was estimated at around 16 million tons of maize, sorghum and some other feed grains.

Table 2 Demands for Concentrated Feeds
(in Terms of T.D.N.)

	(1,000 tons)		
	Total	Domestic Prod.	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.

Soybean consumed in Japan is divided into two purposes, processed foods and oil extraction. The demand for soybean 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 soybean for oil extraction was included, the demand in 1985 was estimated as 5 million tons. For soybean production, it was estimated to increase from 127 thousand tons in 1972 to 427 thousand tons in 1985. The import requirement of soybean was estimated as 4.6 million tons in 1985.

Since the projection reflects the Japanese government's desire to raise self-sufficiency level of food supply including feed stuffs, it is based on the assumption which includes high growth rates of food and feed grains. For this reason, the actual imports are expected to increase more than the figures indicated.

(2) Projection of Demand and Supply of Food in Latin America and World
FAO made projections of several agricultural commodities, commodity by commodity, in 1978.⁵ It has made two sets of projection: basic and supplementary. The former projection is mainly based on the past trends, e.g., the past growth rates, development plans, demand conditions, etc., were assumed to prevail. In the latter projection, the trends referred above were assumed to become higher than the 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 by commodity.

According to the projection, the world production of coarse grains was projected to increase from 654 million tons in the 1972-74 average to 838 million tons in case of the basic assumption and 870 million tons in case of the supplementary assumption in 1985. The 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

5 FAO, "Commodity Projections for 1985" (Mimeo), Rome, June, 1978. It includes commodities such as Cereals, Wheat, Coarse Grains, Rice, Oilseeds, Fats and Oil, and Meats.

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 high demand for coarse grains in Latin American countries is shown in Table 3. It is found from the table that the growth rate of demand for coarse grains as feed stuffs is quite high, but that for coarse grains as foods is almost same or slightly less than population growth rate. The growth rate of coarse grains for feed purpose 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 net trade balance of coarse grains in Latin America and some countries in the region as examples. As shown in the table and previous tables, in spite of a high increase rate of production, Latin America as a whole and most of the countries in the region would become net importing countries except Argentina in case of the basic assumption projected by FAO. Even for the supplementary assumption, the export is almost all that 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 is shown in Table 5. It is found from the table that annual growth rate (compound) of volume of exports is 2.2%, while that of imports is 4.5%.

The facts shown above indicate that the increased agricultural production including both for domestic consumption and for exports has a great importance not only for the development of agriculture but also for the economic development in Latin America.

Table 3 Projected Annual Growth Rate of Projection and Demand of Coarse Grains (1972-74 to 1985)

	Production		Demand			Suppl.		
	Basic	Suppl.	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.

Table 4 Projected Balance of Coarse Grains in 1985

	Production		Demand		Net Balance	
	Basic	Supp.	Basic	Supp.	Basic	Supp.
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
(1961-65 = 100)

	1961-65	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Average Annual
Exports	100	110	109	111	117	121	115	120	125	117	122	134	144	2.2%
Imports	100	110	113	122	124	127	134	141	160	189	168	182	201	4.9%

Source: Food and Agricultural Organization, Trade Yearbook, 1976 and 1977, Rome, 1977 and 1978.

II. STRUCTURAL CHANGES IN AGRICULTURE IN LATIN AMERICA

1. Disparity of Per Capita Income Between Agricultural and Non-agricultural Sector

Among 23 countries of Latin America 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 the countries whose per capita GDP is higher than US\$1,000, while such countries as Haiti, Bolivia and Honduras are those whose per capita GDP is less than US\$500. Generally, per capita GDP is higher in countries which situated along the coast of the Atlantic Ocean.

In 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 of 1975-77. However, if the countries such as Argentina and Uruguay are taken as an example, there is no such discrepancy mentioned above. 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. On the contrary, in Brazil and Mexico, the ratios were 12.7 and 15.6, respectively. It has been also found that the gross products 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 of 1975-77. This shows that the gross product

Table 6 Gross Domestic Product per Capita, Percentages of Gross Agricultural Product (GAP) to GDP, Percentage of Persons Engaged in Agriculture to Total Active and Discrepancy of Agricultural and Non Agricultural Income

	GDP/Pop. (US\$)	GAP/GDP (%)	Agr.Pop./ E.A.Pop. (%)	Percentage of GAP (Gross Non Agr.P./ person = 100)	GAP/ Person (US\$)	Agri.Land Area Incl. Pasture Land (ha)	/Person
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	
Dominica Rep.	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 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 Interamerican Development Bank and FAO, 1977.

per person engaged in agriculture in the former countries was almost five to six times higher than that in the latter countries.

Such higher labour productivities in Argentina and Uruguay are attributed to the larger agricultural land areas per person engaged in agriculture than those of Brazil and Mexico. The agricultural land areas were 127 and 108 hectares in the former two countries, while 13.8 and 13.5 hectares in the latter two countries respectively during the period mentioned above. On the contrary, the land productivities (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 those figures were the lowest along Latin American countries (see Table 7). In Brazil and Mexico, however, the land productivities were higher than those in Argentina and Uruguay, but those of the former countries which were US\$46.9 and 61.0 respectively were not so high compared with those of other Latin American countries.

It should be noticed that the production mentioned above are average figures by country, but they differ by size of holdings. As be seen in the next section, the skewness 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 major factors for the skewed distribution of income. It is also found that the country like Argentina, which has less difference of per capita output between agriculture and non-agriculture sector 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.

2. Unequal Distribution of Agricultural Land

The skewed 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 farming class is still going on in some countries. This has caused not only skewed distribution of income not only in agriculture, but also in the entire economy in a country, since many countries in Latin America still have large

Table 7 Land Productivity and Ratio of Arable Land

	(1) Arable Land (US\$)	(2) Total Agri. Land (US\$)	(3) Ratio of Arable Land (%)
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
Dominica Rep.	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 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 Year Book, 1977.

- Notes:
- (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) $\frac{\text{Arable land + Land under permanent crop}}{\text{Arable + Permanent + Pasture land}}$

Table 8 Distribution of Number and Gross Agricultural Product by Kind of Farm

(%)

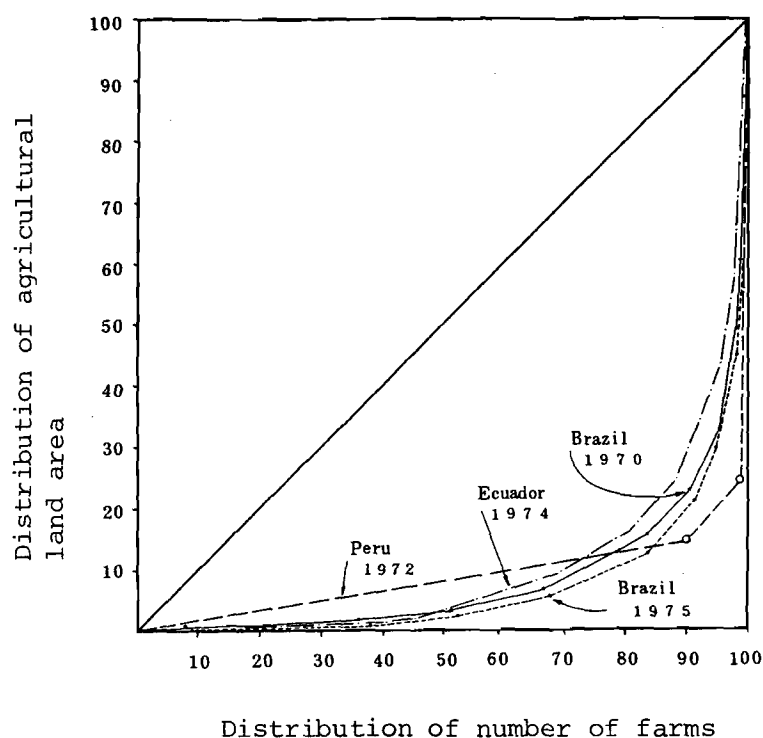
Kind of Farm Country	Sub-family		Family		Multi-family Medium		Multi-family Large		Total	
	Number	Gross Agr. Product	Number	Gross Agr. Product	Number	Gross Agr. Product	Number	Gross Agr. Product	Number	Gross Agr. Product
Argentina ^{1/} (1960)	43	12	49	47	7	26	1	15	100	100
Brazil ^{1/} (1950)	22	3	39	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

Sources: 1/ S.L. Barraclough and A.L. Domike, "Agrarian Structure in Seven Latin American Countries," Land Economics, November 1966, pp.395 - 402, based on CIDA Studies.

2/ Estimated by IDCJ, based on "V Censos Agricola-Ganadero y Ejido," 1970 and "V Censo Ffidal, 1970 Resumen Especial Vol. 1," Secretaria de Industria y Comercio, Mexico, September, 1976.

shares of population in agriculture (see Figure 1). Consequently, most of the countries in Latin America have agrarian reform programs which are given the highest priority among agricultural policies. So far, however, the results of agrarian reform programs have not been very impressive, because it is hampered by social and political reasons in many cases.

Figure 1 Distribution of Agricultural Land in Selected Latin American Countries



Source: Various issued of Censuses of Agriculture in Peru, Ecuador and Brazil

In Brazil in 1970, according to the 1970 Census of Agriculture, 51.4% of the total number of farms who hold less than 10 hectares held only 3.1% of the total agricultural land areas, while only 0.03% of farms who hold more than 10 thousand hectares held 12.3% (see Table 9). In 1975, according to the recent data⁶ the former type of farms (less than 10 hectares) became 52.3% of the total farms and held only 2.7% of the total agricultural land areas, while the latter type of farms (more than 10 thousand hectares) became 0.04% of the total farms and held 14.4% of the total agricultural and areas. Particularly, the number of farms who hold more than 100 thousand hectares increased from 33 to 46 during the 1970-75 period and the total land areas held by them increased from 7 million hectares to 10.3 million hectares. Also the number of farms who hold less than 10 hectares increased from around 2.5 million to 2.6 million and the agricultural land areas held by them decreased from around 9.1 million to 9 million hectares. In other words, the total agricultural land areas (9 million hectares) held by small farms (2.6 million farms) became less than total agricultural land (10.3 million hectares) held by only 46 large farms in 1975.

As mentioned in the previous paper in 1978 ("Towards New Forms of Economic Cooperation 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 favor of large mechanized farms. Number of farms increased during the 1970-75 period were mainly those of one thousand to 10 thousand hectares and more than 10 thousand hectares respectively. Also that of less than 10 hectares increased slightly, but that of 10 to 100 hectares decreased.

Similar situations are also seen in Mexico, in the Central and Andean countries and in countries of River Plate region. Although these countries are small, there is a marked difference of agricultural structure between coast and hilly areas of the countries (see Figure 2).

6 IBGE, Sinopse Preliminar do Censo Agropecuario, V.14, Brasil, Censos Economicos de 1975, 1978.

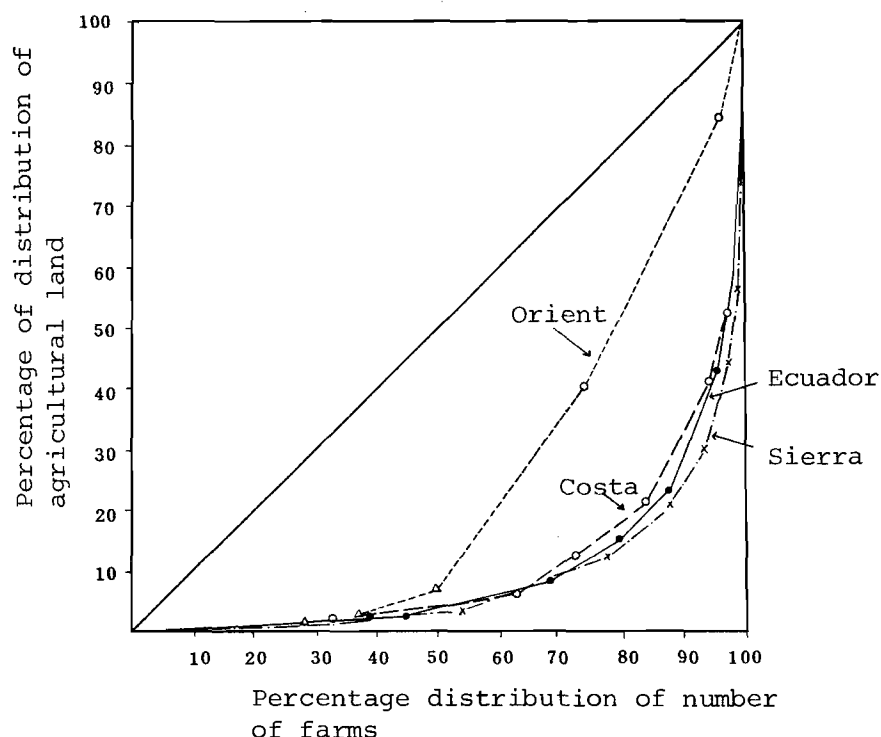
Table 9 Distribution of Farms and Land by Size of Holding (Brazil)

	1970				1975			
	Number of Farm		Agricultural Land Area		Number of Farm		Agricultural Land Area	
	Number	% Distr.	Area (ha)	% Distr.	Number	% Distr.	Area (ha)	% Distr.
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 - 1,000 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 Economicos de 1975, v.14, 1978.

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,⁷ in Ecuador as a whole, there were around 639 thousand farms with 7.7 million hectares of agricultural land. Among those farms around 45% were those with less than 2 hectares and occupied only 2.8% of total agricultural land of the country. The small farmers who held less than one hectare numbered 173 thousand or 27.1% of the total farms, while there are 12 thousand farms which accounted 1.9% of the total farms and they held around 3.3 million hectares or 43% of the agricultural land area of the country, averaging 270 hectares per farm.

Figure 2 Distribution of Agricultural Land by Region in Ecuador in 1974



Source: 1974 Census of Agriculture, Ecuador

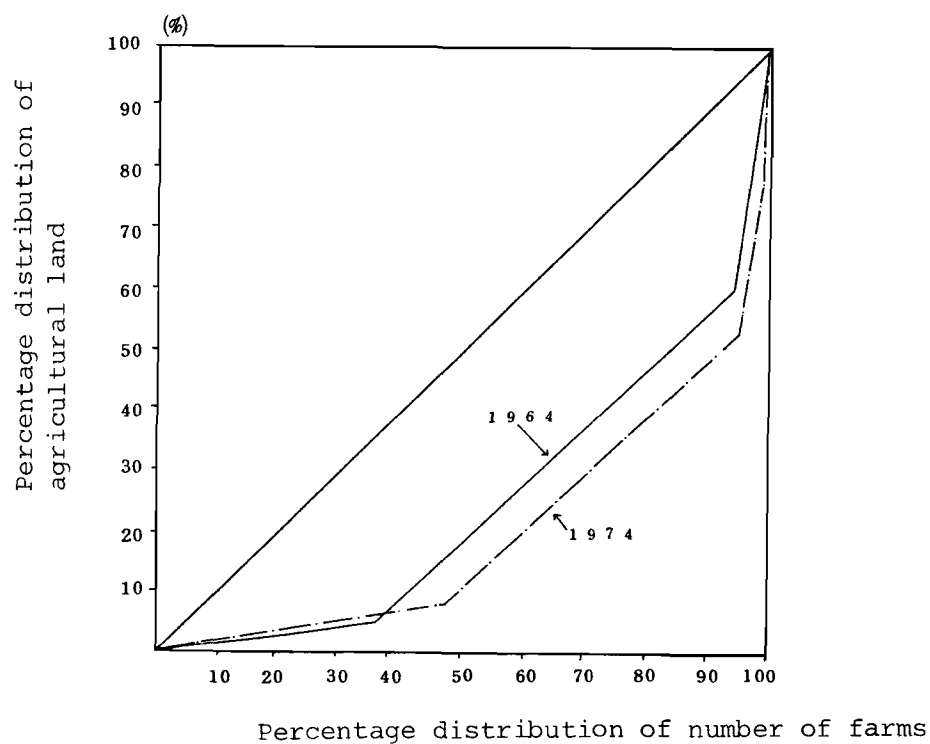
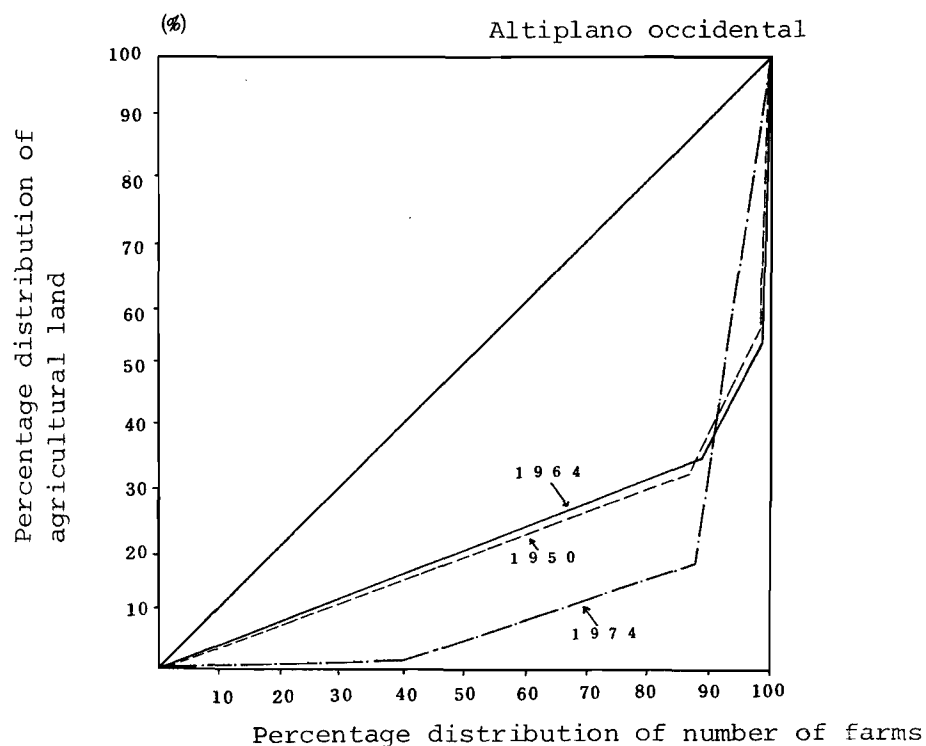
In Sierra which is hilly area and has cool climate, there are 388 thousand small farms which account 61% of the total farms in this country. Among these farms 54.1% of the farms own less than 2 hectares and 132 thousand small farms or 34.1% of the total farms hold only 1.7% of the total agricultural land area averaging only 0.4 hectare per farm. On the other hand, there are 5,504 large farms or only 1.4% of the total farms hold 43.1% of the total agricultural land area averaging 240 hectares per farm.

Costa is the typical tropical area of the country. Climate is hot and humid and suitable for growing tropical crops such as banana, sugarcane, cocoa, coffee and rice. There are 227 thousand farms or about 36% of the total farms in Costa. In this area, 33% of the total farms which owns less than 2 hectares holds 1.7% of total agricultural land in this area, while only 2.8% of the farms who owns more than 100 hectares holds 48% of the total agricultural land area, averaging 320 hectares per farm. There is another area called Orient, the eastern part of the country where the density of population is the lowest which has only 24 thousand with 745 thousand hectares. The area is lowland and the climate is hot and humid partly covered with tropical forest. The number of small holders is smaller than other areas, and only 9.8% of the total farms are those who have less than 2 hectares. Around 57% of the total farms is those of 20 to 100 hectares and 872 farms who own more than 100 hectares or only 3.6% of the total farms hold 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 Universitario de Occidental of the University of San Carlos of Guatemala,⁸ the number of small farms (micro-finca) who hold less than 0.7 hectares and that of larger farms (multi-familiares) who hold more than 45 hectares have increased in Altiplato Occidental (Western Plateau) during the period of 1964 to

8 Quoted from "Diagnostico del Sector Agricola, 1950-77," (Mimeo), Secretaria General del Consejo Nacional de Planificacion Economica, Republica de Guatemala, C.A., Guatemala, Diciembre de 1978.

Table 3 Distribution of Agricultural Land in Guatemala by Region in 1950, 1964 and 1974



Source: "Diagnostico del Sector Agricola 1950-77" (Mimeo)
 Secretaria General de Consejo de Planificacion
 Economica, Rep. de Guatemala C.A., 1978.

1974 (see Figure 3). However, the farms whose size of holding is between the two strata mentioned above decreased during the same period.

In 1950, 86.9% of the farms was those who hold less than 7 hectares and hold 32.5% of the total agricultural land area of the region, while only 1.2% of farms who hold more than 45 hectares held 44.7% of the total agricultural land area. In 1975, percentage of the number of the former small farms became 40.6% and that of area became 1.6% of the total agricultural land area, while the same percentages of the latter large farms became 12.4% and 82.2% respectively. This above change was partly due to a policy which established large scale farms (fincas multi familiares) taken by FYDEP (Empresa Nacional de Fomento y Desarrollo Economico del Peten).

As be seen in the foregoing paragraphs, the polarization of farming classes has occurred in many of 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."⁹ 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.

III. TECHNOLOGY AND INSTITUTIONAL PROBLEMS

1. Low Growth Rate of Subsistence Production

Agricultural production in Latin American countries had increased by 2.9% per annum during the 1961-71 period. Among agricultural production, food production attained the highest growth rate (3.6%) followed by export crops. But the subsistence crops which are consumed directly by

9 John H. Sanders, et al., New Technology and Small Farms: Some Experience with Beans and Cassava, CIAT, Revised 1979, p.8.

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 subsistent crops include maize (except in Argentina and Uruguay), rice (except in Colombia), potatoes, sweet potatoes, cassava and pulses. However, the growth rate of subsistent crops is quite different from a country to another. It was lower than population growth rate in Bolivia, Brazil, Haiti, Honduras, Mexico, Panama, Paraguay and Venezuela. Argentina has the same trend but is an exporting country of grains.

The lower growth rate of production relative to population growth rate would create a rise in price or an increase in import.¹⁰ The annual growth rate of agricultural import index in volume (4.9%) were higher than that of export index (2.2%) during the period of 1961-65 and 1977 (see Table 5). For the price, the consumer price of cassava flour in Brazil increased and export price of beans also increased during the same period. The rises in prices, however, do not benefit always the producers, since most of the producers are subsistence and even if they have marketable surpluses, the market system is traditional and their bargaining power at the market system is weak. Such phenomena indicate the importance of improvement of the sector which produces subsistent crops. If the productivity of subsistent 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 of Small and Large Farms

Modern mechanized technology for crops such as wheat, maize and soybean is mainly suitable for large farms in the countries like the US, Canada and Australia where the limiting factor of agricultural development had been labour. This is quite different from the Asian case in which the limiting factor has been land particularly in the countries like Japan and Taiwan. The scarcity of land has become more serious since

10 John H. Sanders & John K. Lynam, "New Technology Production and Small Farmers - Some Experience with Bean and Cassava," Revised June 1979, (Mimeo) page 2, and Tables in Annex.

Table 10 Index Numbers and Growth Rates for Food and Agricultural Production
in Latin America, 1961-1977: Based on 1961-65=100

	Agricultural Production				Food Production				Subsistence Production				Export Production				Population
	1966-70	1971-75	1977	Growth Rate	1966-70	1971-75	1977	Growth Rate	1966-70	1971-75	1977	Growth Rate	1966-70	1971-75	1977	Growth Rate	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	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.		n.a.	n.a.	n.a.		n.a.	n.a.	n.a.		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 & 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

Sources: 1966-70 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. 1971-77 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.

the World War II in other countries in Asia. This is the reason why the biological and chemical technology, instead of introduction of the mechanical technology, had been introduced in Japan and Taiwan in the earliest period 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 economy or the uneven distribution of agricultural land between small and large farms is still existing. There are extremely large farms who raise cattles 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, numbers of the latter farms are much larger than those the former farms, and the agricultural land area occupied by the latter is only a small part of the total land. But expansion of farm land area by the small farms is rather difficult mainly due to social and political reasons. The new technology based on machinery was introduced by the large farms in recent years. This was mainly induced by the government policies to strengthen competitive position of the export crops of the newly developed land in the world markets. Such technology has mainly been introduced from the US, 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 in Latin American countries, but these varieties of crops have not benefited small farms much. 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 those for wheat was as high as 90% in the same year.¹¹ The reason for this is that the hybrid corn varieties are rather suitable for large mechanized farms since seeds should 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

11 Data provided from Ministry of Agriculture and Livestock, Mexico.

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 sector. Others are CIAT (International Center of Tropical Agriculture) in Colombia, IICA (Instituto Interamericano de Ciencia Agricola) and CATIE (Centro Agronomico Tropical de Investigacion y Enseñanza) in Costa Rica. In these institutes, a new strategy for agricultural research has been taken¹² and it is quite different strategy from the strategy which was taken in other older research institutes such as IRRI and CIMMYT. The new strategy is to put more emphasis on "on-farm experiments" rather than controlled experiments on single crop at the 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 get help from sociologists and economists. The help from them includes evaluation of the technology applied to farmers' fields and discovery of economic and social constraints of the technology. If constraints are found, these are informed to the technicians in the field station as well as in the central research station.

This methodology for evaluating the technology is not only for the single crop cultivation but also for the crop rotations and/or cropping patterns, and the emphasis is laid more on the latters. The new technology to be developed is simple one which uses less inputs for increasing yields, also the crops selected for technical improvements are subsistent 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 on the farm basis, while

12 Data and explanations obtained from experts of IICA, CATIE and CIAT when the present author visited them in 1979 were used to analyze the new strategy. John H. Sander, et al., *ibid*, pp.9-13 was also referred.

economists analyze input and output relations, decision making of farmers, marketing of products, etc.

Similar strategies are applied in the agricultural experiment stations in the individual countries in the region. For instance, in Guatemala, the controlled research for single crops is one third of the total research works and remaining two thirds of the works are those for on the field research of small farmers. Such kinds of research works seem to be useful for small farmers. If the yields of subsistent crops increase, the small farmers who had grown one or two subsistent crops mainly for their own consumption can grow other crops including cash crops using a part of the land. It means intensification of farming which leads to a rise in income of small farmers.

Apart from the strategies for technological improvement, there are various policies for improvement of institutions. The first problem, which is the most important institutional problems in this region, is a skewed distribution of land. In many countries in Latin America, this problem is taken up as "colonization program" which deals with the project to transfer small farms from the area where a large number of such farmers are living to the newly opened areas. It is, however, difficult to find such land areas owned by the government in a large scale except unfertile land or land in remote areas which costs a large amount of money for opening. There is no intension by the government to divide farms which are well utilized and reallocate them to small farmers. It is particularly so if these farms produce export crops, because it means the 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 get full ownership, if land owner and the government agencies concerned arrive at an agreement.

The second problem is so called "commercialization" or that of marketing. It includes various problems, including producer's and consumer's prices, trade margins, wholesale markets, transportation and storage. The third problem is credit problem. Since it is closely related to the problem

of purchasing modern inputs, it is also related to the technological problems.

The approach to these problems are practiced in various ways. The modern inputs which are effective to raise yields of crops are distributed to small farmers by institutional credits with low interest rate and the way of using such inputs to improve their farming efficiently are done by extension workers. Also, the crops which are produced by small farmers are sold jointly to the wholesale market, so that farmers can have a stronger bargaining power. Such a way of integration would be successful if farmers organizations or cooperatives are strong. To organize farmers for such purposes is recommended to the small farmers in many cases by the government.

Since there are various social and economic constraints in many of Latin American countries, actual situations are far from the recommended way of improvement, particularly in the marketing. However, in this case, the sociological conditions of the countries such as existence of rural community which influence the establishment of farmers' organization should be studied more.

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 discussed more in detail analytically.

IV PRODUCTION EXPANSION AND CHANGES IN YIELDS

A brief observation of Latin America's agriculture shows three distinct features of the past development. One of them 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. On the contrary, the growth of yield had been very low. The pattern of

development can be well defined if it is compared 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 by using large motorized machinery.

Table 11 Area and Yield of Cereal Production

Continent		1948-52	1967-72	Growth Rate
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.

The second feature of the development is that the share of medium size farm has increased, while the shares of small and large sized farms have declined. Based on the available data, farm sizes, their shares and their overtime changes are calculated for Mexico, Chile and Sao Paulo, Brazil as shown in Table 12.¹³ Because of a small number of observations, we cannot draw a strong affirmative conclusion; however, we can see a same trend of changing shares of different size farm groups in the three examples. The above share change overtime can be partly explained by the fact that yields of most food crops per unit of land are the highest in the medium size farm group. In Chile, for instance, farms in 200-500 hectare group attained the highest yields in wheat,

13 This point is also mentioned in "Chile: Antecedentes de la Explotacion Familiar," the report prepared by TERRA INSTITUTE.

Table 12 Farm Sizes and Their Distribution in Mexico and Chile

Mexico

	(1,000 farms)						
	0-5 ha	5-25 ha	25-50 ha	50-100 ha	100-500 ha	500-1,000 ha	1,000 ha - Total
1940	928.5 (76.2)	152.6 (12.8)	46.5 (3.8)	31.8 (2.6)	40.1 (3.3)	6.1 (0.5)	9.7 (0.8) 1,218.9 (100.0)
1950	1,000.8 (73.6)	191.3 (14.0)	59.5 (4.4)	43.3 (3.2)	48.7 (3.6)	7.4 (0.5)	10.5 (0.8) 1,365.5 (100.0)

Sources: 1) The United Nations, Progresos en Materia de Reform Agraria, ST/ECA/21, 1954, p.45.
 2) Dirección General de Estadística Mexico, Estados Unidos Mexicanos Tercer Censo Agrícola Ganadero 1950, 1954.

Note: Figures in parentheses indicate shares in percentage.

Chile

	(farm)					
	0-5 ha	5-20 ha	20-100 ha	100-500 ha	500 ha -	Total
1935	87,790 (49.1)	41,400 (23.2)	32,300 (18.1)	12,300 (6.9)	5,000 (2.8)	178,790 (100.0)
1955	67,366 (32.7)	53,649 (26.1)	50,899 (24.7)	23,845 (11.6)	10,151 (4.9)	205,910 (100.0)
1964	123,636 (48.8)	63,047 (24.9)	44,145 (17.4)	16,171 (6.4)	6,493 (2.6)	253,492 (100.0)

Sources: 1) Dirección General de Estadística Chile, Agricultura 1935/36 Censo, Santiago, 1938.
 2) The United Nations, Progresos en Materia de Reforma Agraria, ST.ECA/21, 1954, p.49.
 3) Dirección de Estadística y Censos, IV Censos Nacional Agropecuario, 1964/65, p.2-3.

Note: Figures in parentheses indicate shares in percentage.

Sao Paulo, Brazil

	(farm)					
	0-9 ha	10-99 ha	100-999 ha	1,000-2,999 ha	3,000 ha -	Total
1954	96,012 (33.9)	149,927 (53.0)	34,125 (12.0)	2,432 (0.9)	584 (0.2)	283,080 (100.0)
1957	109,728 (36.2)	154,916 (51.0)	35,668 (11.8)	2,400 (0.8)	573 (0.2)	303,285 (100.0)
1967	94,712 (32.0)	161,602 (54.5)	36,910 (12.5)	2,267 (0.8)	447 (0.2)	295,968 (100.0)

Sources: Governo do Estado de Sao Paulo Secretaria da Agricultura, Instituto de Economia Agrícola, Modernization of Agriculture in the State of Sao Paulo, Sao Paulo, 1973, p.101.

Note: Figures in parentheses indicate shares in percentage.

barley and oats production.¹⁴ Also the available data for El Salvador shows that yields of wheat, barley and rice were the highest in the medium sized farm group.¹⁵

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. Instituto de Economia Agricola, Sao Paulo, Brazil classifies major crops in several technological groups in the Modernization of Agriculture in the State of Sao Paulo as follows.¹⁶

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 benefitted from newly developed technology, or if such technology exists, it has been applied on a very small scale. Analyzing the degree of technological development of the 16 products that have been traditionally cultivated in Sao Paulo, we can classify them in the following way:

- a) Modern group--cotton, oranges, potatoes, soybeans, sugarcane.
- b) Group in transition--coffee, corn, peanuts, manioe onions, bananas, tea.
- c) Traditional group--beans, rice, castor beans.

Between 1961-65 and 1974-76, crop yields with respect to technological groups vary substantial as shown on Table 13. Yields of those products falling into the modern group grew rapidly. Among those products

14 Direccion General de Estadistica, Chile, Agricultura 1935/36 Censo, Santiago, 1938, pp.13-27.

15 The United Nations, Proyecciones Macroeconomicas para America Latina en la Decenio de 1970, E/CN.12/865/Rev. 1, 1972, p.147.

16 Instituto de Economia Agricola, Modernization of Agriculture in the State of Sao Paulo, Secretaria de Agricultura, Governo do Estado de Sao Paulo, 1973, p.267.

included in the modern group, tomatoes which has a limited importance attained the highest growth rate in yields. Following tomatoes are soybeans and potatoes with 3.9% and 3.7% a year, respectively. Although sugarcane 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.

Table 13 Crop Yields in Brazil

Product	Average 1961-65 (kg/ha)	Average 1974-76 (kg/ha)	Annual Growth Rate (%)
Modern			
Potatoes	5,902	9,170	3.7
Sugarcane	43,332	45,300	0.4
Tomatoes	14,060	23,389	4.3
Soybeans	1,049	1,660	3.9
Transitional			
Corn	1,294	1,585	1.7
Coffee	462	488	0.5
Tea	317	504	3.9
Ground-nuts in Shell	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.

Yield growth of the products consisting the transitional group has mixed trends. Yields of tea, corn and coffee increased, while those of ground-nuts in shell and cassava declined. Since values of corn and coffee production substantially larger than those of ground-nuts and cassava production, the aggregated yield of the products in this group increased. But, yields of the traditional group showed a tendency of a moderate decline during the period under investigation.

Crop yields and their changes between 1948-52 and 1966-70 in the state of Sao Paulo are shown on Table 14 and they indicate a similar pattern of yield changes as Table 13 does. Generally crops in traditional group are subsistent crops which are mainly raised by small farmers, while crops in modern group are commercial and export crops which are produced by medium farmers.

Table 14 Crop Yields in Sao Paulo

Product	Five Year Period		Annual Growth Rate (%)
	1948-52 Kilos/Hectares	1966-70	
Modern			
Cotton	560	1,439	5.1
Potatoes	5,210	11,881	4.4
Sugarcane	45,600	47,099	0.2
Oranges	8,950	10,738	1.0
Tomatoes	14,010	21,096	2.2
Soybeans	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

Source: Instituto de Economia Agricola, Modernization of Agriculture in the State of Sao Paulo, Secretaria da Agricultura, Governo do Estado de Sao Paulo, Sao Paulo, 1973, p.46.

From the above observation, it can be said that the past development of Latin America's agriculture was mainly land extensive expansion and that farmers in the mainstream of development were medium size farmers

who adopted modern techniques of production attempted to respond quickly to market stimuli.¹⁷

V ANALYTICAL FRAMEWORK OF LATIN AMERICAN AGRICULTURAL DEVELOPMENT

Despite the rapid expansion of crop acreage and production in Latin American countries, their agriculture could not have solved a major problem, unemployment and equity, in rural areas. Our observation indicates that rapid acreage expansion had been done by a capital intensive method although there were many unemployed and underemployed. In the following, an analytical framework which explains the agricultural development in the previous section and its major propositions are offered as hypotheses to be tested with 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.¹⁸

Define AB as a unit cost line, $P_t T + P_{kt} K = 1$, 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 ray RI, and profits are zero.

17 Since our analysis is based on the data during the 1950s and the 1960s, its framework to diagnose situation in the 1970s may not be the best one. According to ECLA officials, the situations in Latin America in the 1970s were improved significantly toward in favor of small farmers.

18 Schuh, G. Edward, "The Exchange Rate and U.S. Agriculture," American Journal of Agricultural Economics, Vol. 56 (February 1974), pp.1-13.

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 will 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.

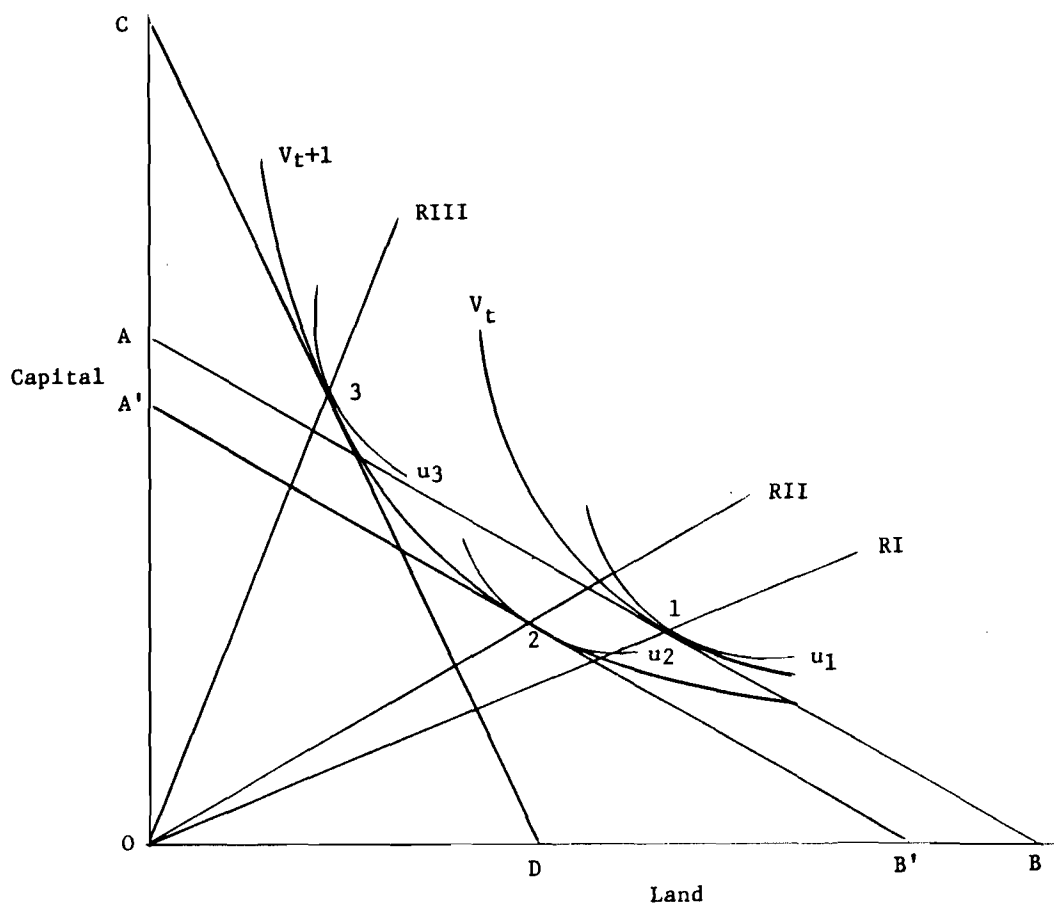
First, assume that product demand is perfectly elastic and land is relatively inelastic in supply. Innovation or the adoption of new production technology on the part of farmers results in profits. This is equivalent to an increase in rate of return on owned resources. If the capital market was previously in equilibrium, the increase in rate of return to 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 would rotate in a clockwise fashion. This would provide incentive for innovators in the direction of land augmenting technical change and would shift factor proportions to a point along a ray lying to left of ray RI such as ray RIII.

As the second case, assume 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 the 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 effect, the benefits of the technical change 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 realtive factor prices do not change, the new equilibrium will be at point 2. For the above two development patterns described, land scarce countries took the first type of development pattern while many Latin American countries in general took the second pattern.

Figure 4 Innovation Possibility Curve and Production Isoquants



Even though Latin American agriculture has been developing using land extensively as a whole, there exists two types of farms, subsistent farm which cannot adopts new production technology and large farms which can be adopters of new technology. Their respective production functions can be described as follows:

$$Q_s = f_s (VI|K, AL, L) \quad (1)$$

$$Q_l = f_l (VI, AL, L|K) \quad (2)$$

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 : labor.

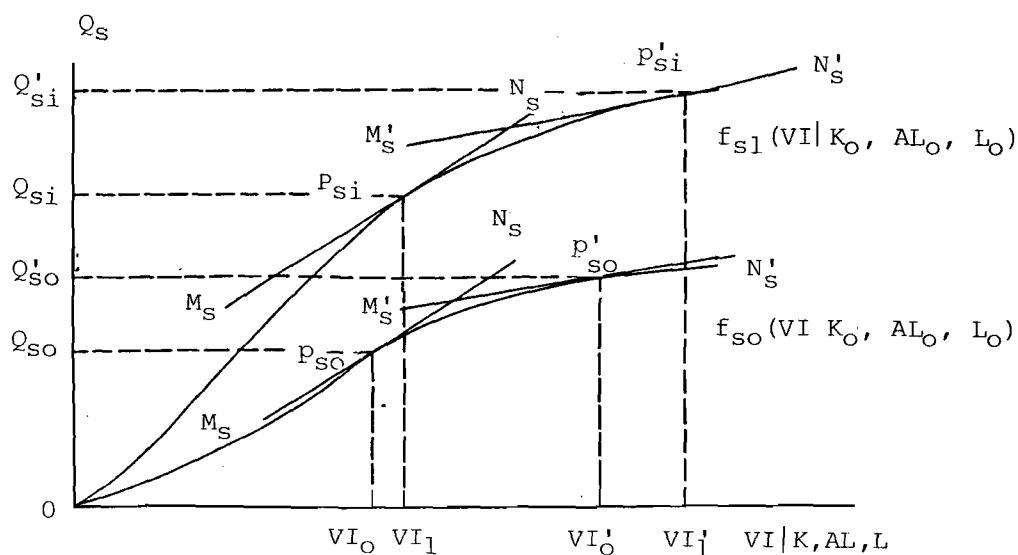
Among the inputs in each production function, inputs on the left side of the bar are relatively easily changeable and available inputs and will be called variable inputs in the following analysis, whereas those on the right side of the bar are inflexible inputs and will be called fixed inputs. For the small farm, current inputs are variable inputs and the returns of production activities accrue to the fixed inputs such as capital, land and family labour.¹⁹ For the large farm, to the contrary, current inputs, land and hired labour are variable inputs and capital is the fixed input. Then 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) become equal to 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 become equal to 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.

19 Agricultural family workers usually stay in areas some distance from non-agricultural employment. Also they have a great deal of highly specialized knowledge and skill, and this knowledge and skill have little value in other industries. So potential off-farm wages must be discounted substantially by the costs of moving and commuting, and due to lack of skills which the off-farm employment opportunities require. For this reason, both family and hired workers in agriculture will not move out except real young ones and can be regarded as fixed assets in agriculture.

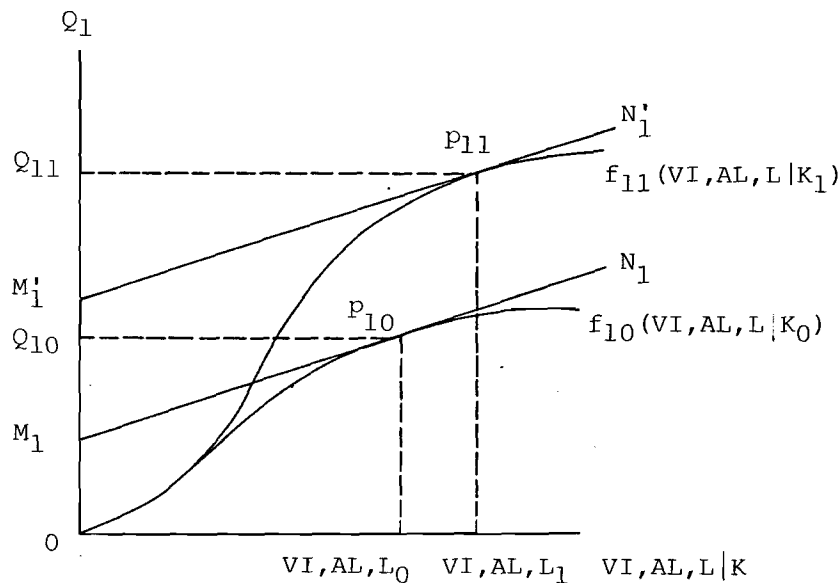
To increase returns on the small farms with a given amount of fixed inputs, there are two ways. One is to shift production function upwards from f_{s0} to f_{s1} and to attain production point p_{s1} as shown on Figure 5. It means to introduce new chemical and biological technology and to increase yields 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 $M'_s N'_s$. Then line $M'_s N'_s$ touches production function f_s at higher point p'_{s0} .

Figure 5 Technological Progress



To increase returns on the large farms with a given amount of capital input, there are also two ways. As described in the first case of the 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 attain scale economy by using a relatively cheap input, land. On 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 , production function will shift to f_{11} from f_{10} and 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 . The past empirical analysis in the US and Brazil shows there

Figure 6 Scale Economy



is also an economy of scale in large scale production in agriculture.²⁰ As the results, production point p_{11} produces higher rate of returns on a unit of capital than production point p_{10} does. So the farmers who can have access to capital markets and credits, mainly large farmers, expand capital inputs and obtain higher returns on capital. When they use larger 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 relatively cheap and abundant input in comparison to other input, Latin America's agriculture as a whole took the development pattern which exploits land extensively in the 1950s and 1960s. Main participants for this type of development have been medium farmers who (1) had easy access to capital markets and new technology and (2) could afford to purchase relative cheap capital inputs in comparison to current inputs such as fertilizer and insecticide. Since the current

20 See more detail 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.934-9, and Instituto de Economia Agrícola, Prognostico 73/74 Secretaria da Agricultura, Governo do Estado de Sao Paulo, Sao Paulo, 1973, p.3-3.

inputs have been relatively expensive and new chemical and biological technology to increase crop yields has not been easily available, the small farmers were left behind from the past progress of agriculture.

VI FACTORS WHICH AFFECTED THE PAST AGRICULTURAL DEVELOPMENT

As we have seen in the previous sections, main participants of the past agricultural development have been medium farmers who introduced foreign technology and expanded their farms. In this section, we will investigate some causes which have led to the pattern of development using presently available data. Since the data is not recent one, it may not reflect the present situations well and we suppose that the present conditions are much improved than the data shows.

1. Yield Growth and Number of Experiment

The change in yields in Table 13 partly reflect the number of experiment projects shown in Table 15 which were undertaken in Brazil in 1961. Although the importance of rice and edible beans ranks the first and the fifth among the major crops in 1966, the number of experiment projects in 1961 was 49 and 45, respectively. The number was much smaller than that for corn, sugarcane and wheat whose growth rates 1.7%, 0.4% and 1.9%, respectively, between 1961-65 and 1974-76. This small number of experiment projects in the early part of the 1960s might have been one of main causes for declining yields of rice and edible beans.

Since the values of rice and edible beans production are one of the largest among crops, the declines of their yields have quite important impact on the agricultural sector economically. Because these two products have not been the major export products in spite of their large values of production, they must have been produced on the small farms and the important food crops for farmers. And 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			In 1961
	Area	Value of	Rank	Number of
	Cultivated	Production		Experiments
	(1,000 ha)	(1,000 ner\$)		
Rice	4,005	865.4	1	49
Corn	8,703	810.6	2	158
Sugarcane	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	na
Potatoes	199	222.4	9	80
Wheat	717	156.1	10	103
Oranges	165	122.4	11	na
Cocoa	456	97.7	12	na

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 be observed in Mexico, too. Table 16 shows numbers and shares of farmer 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 on the latter table, yields went up by 5.1% and 1.5% for wheat and maize, between 1961-65 and 1974-76, 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 the crops whose major growers are smaller farmers can be identified on Table 18 which shows levels of input utilization and mechanization among farmers. Among the inputs, the first three (high yield seeds, fertilizer and pesticide) affect mainly yields of crop, whereas the last three (tractor, draft

Table 16 Numbers and Shares of Cultivator by Crop

	(No. 1,000)											
	Maize			Pulses			Wheat			Rice		
	No.	% of Crop	% of Total	No.	% of Crop	% of Total	No.	% of Crop	% of Total	No.	% of Crop	% of Total
Total	<u>1,691.9</u>	66.2	<u>100.0</u>	<u>346.4</u>	13.6	<u>100.0</u>	<u>80.9</u>	3.2	<u>100.0</u>	<u>41.1</u>	1.6	<u>100.0</u>
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: CEPAL: "Economía campesina y agricultura empresarial: Tipología de productores del agro mexicano," unpublished document.

animal and mechanization) influence labour productivity of crop. As shown on the table, the levels of the first three input utilization are very low among smaller farmers in comparison to larger farmers. Important problems related to this situation may be the inappropriate policy followed by many extension services, relatively higher prices of the first three inputs and lack of knowledge about complementarities among inputs.

Table 17 Crop Yields in Mexico

Product	Average 1961-65 (kg/ha)	Average 1974-76 (kg/ha)	Annual Growth Rate (%)
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

							(%)
Farm	Input HYV	Ferti- lizer	Pesti- cide	Tractor	Draft Animal	Mechani- zation	
Total	11.9	24.5	10.7	21.1	65.8	13.8	
Infrasubsistencia	4.7	18.1	3.0	10.3	69.5	5.9	
Subsistencia	10.7	18.8	8.5	17.9	66.5	10.1	
Rep. Simple	14.8	22.8	11.8	25.0	64.5	14.3	
Excedentarios	22.6	31.3	17.1	34.3	55.9	25.3	
Transicional	29.2	48.3	33.5	50.8	59.1	35.2	
Pequenos	43.7	65.8	55.8	74.9	50.1	62.9	
Medianos	51.0	73.3	65.8	84.6	45.3	79.5	
Grandes	59.3	82.6	76.5	91.1	42.2	89.6	

Source: CEPAL, "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 indices for inputs used for Sao Paulo agriculture underwent substantial decline as compared to the prices received for the state's agricultural products as shown on Table 19. But during the next 16 years from 1954 to 1968, price indices for inputs increased substantially in comparison to the prices received. In general terms, the relationship between prices paid and prices received was somewhat more favorable for agriculture during the initial part of the period analyzed.

In the next period (1954-1968), the parity index continued to become less favorable to agriculture, in spite of declining input prices. In the third period (1969-1977), the trend has turned around and the prices received have increased substantially compared to the prices paid mainly due to the world-wide shortages of agricultural products.

Within the general picture there existed, however, groups of inputs with price trends considerably different from all input aggregated. Table 20 shows quantities of major crop required to purchase 10 tons of fertilizer and those of the same crop 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 soybeans. In 1978, it could be purchased only with 422 sacks of rice, 1,046 sacks of corn or 603 sacks of soybeans. In 1967, ten tons fertilizer could be purchased with 100 sacks of rice, 290 sacks of maize or 150 sacks of soybeans. The fertilizer price declined slightly and the fertilizer still required 92 sacks of rice, 228 sacks of maize or 162 sacks of soybeans in 1978. On the average, the price indices of fertilizer have declined slightly, while the tractor price has gone down by almost 50% relatively to the prices of major crop. Due to this situation, fertilizer became relatively more expensive in 1978 than in 1967 in relation to machinery.

Table 19 Price Indices for Sao Paulo Agriculture

	Prices Paid ¹⁾	Prices Received ¹⁾		Prices Paid ²⁾	Prices Received ²⁾
		21 Products	21 Products Less Coffee		
1948	107	90	103		
49	105	94	102		
50	98	109	95		
51	95	103	99		
52	95	102	102		
53	96	109	108		
54	102	115	98		
55	106	110	105		
56	108	104	105		
57	108	98	99		
58	109	84	96		
59	118	82	98		
60	117	89	107		
61	114	91	111		
62	114	99	120		
63	117	98	113		
64	110	104	110		
65	119	85	100		
66	106	87	111	100	100
67	101	77	95		
68	104	76	90		
69	105	87	95		
70	101	90	92	82	94
71				83	99
72				86	109
73				93	137
74				126	134
75				138	136
76				118	154
77				121	162

Sources: 1) Instituto de Economia Agricola. Modernization of Agriculture in the State of Sao Paulo. Secretaria da Agricultura, Governo do Estado de Sao Paulo, 1973, p.84.

2) Conjuntura Economica, Vol. 32, No. 6 (June 1978), pp.147-86.

Note: All prices are in the real term.

Table 20 Agriculture Produce Required to Purchase a Tractor (44 HP)
and 10 Tons Fertilizer in Sao Paulo, 1967-1978

	Tractor						Fertilizer					
	Rice Paddy		Corn		Soybean		Rice Paddy		Corn		Soybeans	
	SC. 60kg	Index	SC. 60kg	Index	SC. 60kg	Index	SC. 60kg	Index	SC. 60kg	Index	SC. 60kg	Index
1965												
66												
67	727	100	2,147	100	1,105	100	100	100	290	100	150	100
68	729	100	2,595	121	973	88	100	100	360	124	130	87
69	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
71	524	72	1,531	71	684	62	80	80	250	86	110	73
72	518	71	1,475	69	681	62	90	90	260	90	120	80
73	499	69	979	45	456	41	100	100	200	69	90	60
74	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
76	617	85	1,064	50	561	51	106	106	183	63	96	64
77	598	82	1,363	63	545	49	148	148	337	116	136	90
78	422	58	1,046	68	603	54	92	92	228	79	162	108

Source: Instituto de Economia Agricola, Prognostico 78/79, Secretaria de Agricultura, Governo do Estado de Sao Paulo, 1978, p. 46 and p. 55.

It should be noted that yields in Latin America for most of crops are much lower than they are in other parts of the world. Data on a selected group of crops are presented in Table 21 with comparison to major producing countries of the world. It is clear that a country with the abundant supply of land that most of the Latin American countries have will not be obtaining 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 of the small farmers who could play as a major food supplier to their domestic markets. Moreover, increasing yields will help in raising labour productivity and, in turn, the real returns to labour on the small farms.

In order to increase yields in the agricultural sector, it will be necessary to introduce modern inputs into production process of especially small farmers. These include mainly fertilizer, high yield seeds and insecticide. Some of these are not available. Or even they could be available, but 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 only available data of Argentina and Mexico for Latin American countries. In order to buy a unit of urea, the Argentina farmers have to pay 163% more wheat than the American farmer, and 111% more than the Japanese farmer. For rice the situation is more impressing when compared with the United States. The Argentina farmer needs 518% more rice to buy a unit of urea fertilizer. Also Mexican farmer has to pay 173 more sugarcane to buy a unit of urea than the American counterpart does. Hence, 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. Hence, an important reason for the failure to adopt fertilizer on especially small farms in relatively input prices.

Table 21 Comparative Yields of Selected Crops,
Latin America and Other Countries

				(kg/ha)
Latin America			Other Countries	
1975-77			1975-77	
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		
Soybeans	Brazil	1,721	U.S.A.	1,896
	Mexico	1,825		
Sugarcane	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.

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	n.a.	2.94	3.50
Corn	8.70	n.a.	4.17	n.a.
Rice	10.44	n.a.	1.69	n.a.
Sugarcane	n.a.	40.55	14.85	n.a.

Source: FAO, Production Yearbook 1975, Vol. 29, Rome, Italy, 1976.

- Notes: 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.

3. Scale Economy of Corn Production

The previous section states there is an economy of scale in agricultural production. As one of the examples, cost comparison between animal and motorized cultivation methods is shown on Table 23. Using the same amount of seeds and fertilizer, the animal cultivation method produces 2,460 kg per hectares, while the motorized cultivation method produces 3,000 kg per hectares. Except seeds and fertilizer, both methods employ different quantity of inputs depending on substitution of labour for machinery. The costs per hectares amount to 691.32 cruzeiros and 797.61 cruzeiros for the animal and motorized cultivation methods, respectively. Even though the per hectares costs are higher for the motorized cultivation method, the costs per ton are lower (265.87 cruzeiros) for the motorized cultivation method than that (281.02 cruzeiros) for the animal cultivation method since the former produces a higher yield. As described, a large scale farm produces a unit of output with less costs and it has an economic advantage over a small farm. This scale economy could be one of sources for extremely high returns on capital investments which was found in the previous year's study.

Table 23 Cost Comparison Between Animal Traction and Motorized Traction for Corn Production

	Yield (kg/ha)	Labour Cost (cz/ha)	Seeds (cz/ha)	Ferti- lizer (cz/ha)	Chemical (cz/ha)	Other Inputs (cz/ha)	Depreci- ation (cz/ha)	Costs (cz)	
								ha	ton
Animal Traction	2,460	287.20	19.95	202.95	-	172.49	8.73	691.32	281.02
Motorized Traction	3,000	179.70	19.95	202.95	-	323.57	71.44	797.61	265.87

Source: Instituto de Economia Agrícola, Prognostico 3/74, Secretaria da Agricultura, Governo do Estado de Sao Paulo, Sao Paulo, 1973, p. 3-3.

In addition to three factors mentioned above, there may be other factors which led to the Latin America's pattern of agricultural development. Some of those factors are marketing systems of agricultural inputs and outputs, agricultural credits systems and trade policies. Due to lack of data, any solid effects of those factors on the pattern of agricultural development cannot be identified. But several reports indicate that those factors also have been working in favor of medium and large size farms.²¹ So the major factors analyzed above together with marketing systems, credits systems and trade policies formed the past development pattern of Latin America's agriculture.

VII ECONOMIC AND TECHNICAL COOPERATION BETWEEN LATIN AMERICA AND JAPAN

As described in the previous parts, main problems to be tackled are expansion of agricultural production which supplies plenty 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 of food. Some other countries such as Argentina and Brazil are exporting food and feed grains. Even though they are exporting grains, their export have not been stable. One of the factors which created export

²¹ Economic Commission of Latin America, Situation and Evolution of Food and Agriculture in Latin America, E/CEPAL/1017, Juen 9, 1976.

fluctuations is the climate. Another factor is the change in consumption patterns of foods particularly due to the increase in per capita income. As per capita income increase, the demand for livestock products which require a large amount of feed grains increases in the domestic markets. Such phenomena are seen in many countries in Latin America and in spite of favorable man and land ratio for expansion of agricultural land area, their export 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 practiced mainly due to the social and political climates of the countries concerned. Agricultural technologies of both of large farms (latifundio, particularly cattle raising farms) and small farms (minifundio) are traditional ones in many countries in Latin America, and both labour and land productivities of the large farms are particularly lower than those of the developed countries.

New medium and large enterprise farms which introduce the modern technology have been coming out and their agricultural productivities have been much higher than those of large and small farms which use the traditional technologies. Since the technology adopted by the new medium and large enterprise farms are 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 usually raised by the 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 in the markets. Also the mechanized farming systems of the modernized farms will deprive small farmers' job opportunities on large farms. This situation will widen the income gap between small and large farmers unless some policies which encourage small farmers to adopt new farming technology or which create job opportunities for the small farmers.

There are two ways for the technical and economic cooperation between Japan and Latin America; one is the direct financial cooperation for agricultural development and the other is the technical cooperation.

Public and private financial cooperations of Japan to Latin America in the field of agriculture is so far mostly concentrated to Brazil in which Japan has invested in development of livestock industry, feed grains and soybean farms. Japan has invested to 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 cerrads areas for development of farms which grow mainly maize and soybean.

As described in the previous parts, main participants of the past agricultural progress are medium and large farmers who have access to capital markets and new mechanized technology, and the majority of small farmers were left behind the past progress. Even though it is difficult to prove a worsening income distribution, the past pattern of agricultural development might have widened a gap of income distribution between small and large farmers. To close the gap and to attain further economic growth at the same time, the small farmers who were left behind the progress have to be brought back to the main stream of development and to be the major participants of progress.

From our analysis in the previous sections, we can identify two approaches to bring the small farmers who own limited resources. Presently the small farmers employ traditional production method with relatively expensive variable inputs such as fertilizer and their yields are low. One way to increase their yields is through development of new chemical and biological technology available to the small farmers. If the new technology prevails among them, their production function shifts upwards and quantity of 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 reduce relatively expensive fertilizer prices. Even with the presently used technology, yields will go up with the larger amount of fertilizer if fertilzier prices decline. This price change alone leads to larger fertilizer application and increases

output. Together with the new chemical and biological technology, the decline of fertilizer price shifts the production level upward and increases output substantially. The two mentioned approaches to increase yields and total production can be undertaken thoroughly by the small farmers with assistance of governmental policies. In addition to the new chemical and biological technology, the mechanized farming technology with small scale machinery may benefit small farmers. Even though small farmers have usually plenty of family labour forces during the off-harvest season, they often suffer from labour shortages during the harvest season. A shortage of labour is one of serious constraints for small farmers to increase output. If they can introduce the mechanized farming technology with small scale machinery, they can remove a labour shortage constraint and exploit earning opportunities.

In relation to Latin America's present problems in agriculture which we described above, let us consider what type of cooperation can solve the problems and strengthen the economic ties between Japan and Latin America. There are three approaches for increasing productivity, expanding output and attaining an equity goal in the future: (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 to Latin American farmers and (iii) to improve infrastructure which raises yields of farm land. Through any of these approaches, output and productivity can be increased either by raising yields or by more intensive use of land in multiple cropping systems which absorb underemployed rural labour forces significantly.

Japanese technology which was developed during the last several decades is suitable for adaption on small- and medium-size family farms and likely to enhance the utilization of available rural resources, in particular labour forces. What type of new technology is appropriate will differ from one country to another depending on the capacity of a society to mobilize surplus labour for productive purposes effectively. In relation to the three approaches above, the economic and technical

cooperation between Latin America and Japan can be summarized more specifically in the following:

- 1) Concerning financing problems, Japan has already financed to the farms in Brazil and some other countries of the region. Japan would be able to provide finance in future for the development of agriculture including land development and construction of infrastructure (i.e., irrigation feeder road, etc.) in those countries and some more countries. However, it should be noticed that it is related to what strategies are taken by each country.
- 2) Since the strategies newly taken by CIAT and other international institutes concerned with agriculture lay emphasis to the improvement of agriculture of small and medium farmers, technical cooperation to small farmers including encouragement of their organization would be required. Japan has long history of intensive farming and organization of small and medium farmers, e.g., agricultural cooperatives, so that the technical cooperation in these fields would be most suitable for Japan.
- 3) Japan had already sent some experts in the past in the fields of rice, vegetable, fruits growing which were expected to benefit small and medium farmers for intensification of farming to some of the Latin American countries. Such cooperations include processing of agricultural products. These kinds of technical cooperations would be continuously done in future at the request of the countries.
- 4) There is another technical cooperation for the development of new technologies from Japan for the betterment of basic study of agricultural sciences suitable for small farmers. Japan has quite many basic research workers such as plant breeders, plant physiologists, plant pathologists and soil scientists. They can cooperate with the same experts in the countries of Latin America who know local conditions better.
- 5) Historically, technological and institutional innovations have contributed to the agricultural development much in Japan after Meiji Restoration. Among which, since Japan has had long experience for organizing farmers for the diffusion of

new technology, improvements of credit and marketing facilities, Japanese experts could give guidance to the improvement of institutions mentioned above for small and medium farmers.

There may be other approaches to expand agricultural production and to bring the small and farmers back to main streams of economic progress, however, the approaches may be too expensive for the most of the countries in Latin America. We think that the above three approaches are tedious, but essential components for further progress at the present stage of Latin American economic development.

CHAPTER 5 NEW FORMS OF COOPERATION IN MARITIME TRANSPORT

INTRODUCTION

The rapid expansion of international trade after the end of the Second World War was supported by large scale structural change in the world maritime transport system accompanied by technological innovations in shipbuilding and increase of the tonnage of ship.

Economic relations will become closer in the future between Japan and the Latin American countries, and the establishment of a more efficient maritime transport system between them will strongly be required, 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 cooperation 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 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.

I. BASIC PROBLEMS OF LATIN AMERICAN MARITIME TRANSPORT

1. The Position in the World Maritime Transport

One of the problems in Latin American maritime transport is that the share of the tonnage of the Latin American countries among the world total 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, the 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% in 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 those of 733 for Africa and 376 for Asia during the same period.

2. Non-Uniformity of the Development

Table 2 shows the changes in the shares for 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 gradually starting to be introduced in Latin America.

For example, according to the report of a maritime transport specialist (Sepúlveda-Whittle of ECLA),¹ 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 and the Latin America's share of this tonnage. It should be pointed out that there is a tendency in Latin America for an increase in combination carriers such as O/B and O/B/O, and semicontainer vessels. Full container vessels were introduced after 1975.

However, one of the characteristics of maritime transport in the Latin American countries is the non-uniformity of the regional distribution of the introduction of shipping technology. According to ECLA

1 Tomás Sepúlveda-Whittle, Maritime Aspects of Trade Between Japan and the West Coast of South America, March, 1978 (draft).

Table 1 Shares of Latin American Ship in the World Maritime Transport (Gross tonnage)

(Million ton)							Index 1978 1965=100
	1965	1970	1975	1976	1977	1978	
World	146.8 (100)	217.9 (100)	336.9 (100)	367.1 (100)	388.5 (100)	400.7 (100)	273
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
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
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

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	n.a.	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)

(Million DWT: %)										
	All Ships	Tanker (150.000DWT or More)	Tanker (under 150.000DWT)	O/B O/B/O	Bulk Carrier	Full Con- tainer	Semi Con- tainer	Ro/Rc Cargo Ships	General Cargo Ships	Other Ships
1976	103.5 (7.1)	38.6 (2.9)	12.3 (4.8)	5.5 (24.4)	25.8 (10.2)	2.3 (2.1)	0.1 (48.5)	1.2 (0.4)	11.4 (129)	6.3 (1.6)
1977	65.7 (9.6)	17.2 (6.6)	7.4 (4.3)	3.2 (38.6)	18.1 (13.5)	1.9 (1.7)	0.3 (16.1)	1.6 (1.8)	10.7 (8.7)	5.3 (2.3)
1978	41.0 (13.4)	7.9 (14.3)	5.6 (7.2)	1.9 (42.5)	10.2 (21.6)	1.8 (1.2)	0.2 (6.6)	1.4 (3.9)	7.7 (10.4)	4.2 (0.7)

* as of 30 September 1976, 1977, 1978

Source: UNCTAD, Review of Maritime Transport, 1978 (Table 18)

studies,² Latin America is divided into the following four regions in accordance with the degree of introduction of maritime technology.³

- 1) 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 the most delayed in this region.⁴
- 2) Caribbean coastal area: this is the areas of Mexico and Central America on the Caribbean side. It is not much developed with the exception of two or three specific ports. RO/RO services are still limited to a few ports.⁵
- 3) North and east 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.⁶
- 4) Caribbean area: modern technology has been completely introduced into this area. Ports can handle RO/RO, full container and LASH ships and the harbor facilities have been provided.

2 CEPAL, Facetas Económicas e Institucionales de las Nuevas Tecnologías de Transporte en América Latina, Septiembre, 1974.

3 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 |

4 At present, there is in the planning stage a project for the containerization of the route between these ports and north-west Europe. A container terminal is under construction in Ecuador.

5 The Caribbean area is attended by the CAROL containerized service from north-west Europe.

6 Container terminals are under construction in Brazil and Uruguay.

This inequality in technical backwardness and development is one of the causes of the imbalance and instability of exports and imports in the region. This is analyzed in II-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.⁷ 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 the ECLA, to improve harbor administration in Latin American countries, and measures are being considered including those related to the legal and administrative sectors.⁸

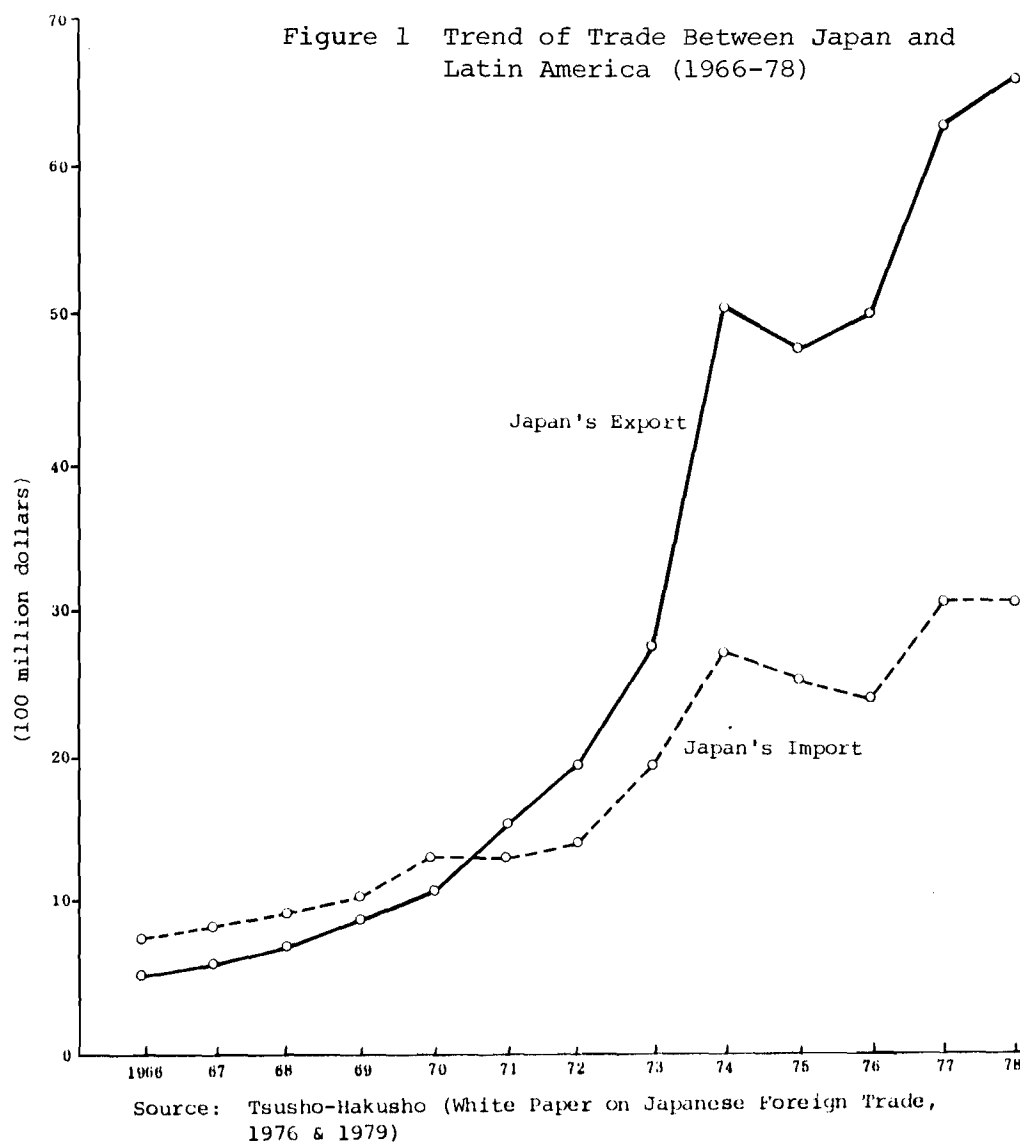
II. CHARACTERISTICS AND PROBLEMS OF MARITIME TRANSPORT BETWEEN JAPAN AND LATIN AMERICA

1. Main Characteristics

Concerning 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 from 1971 and was remarkable in 1974 (Figure 1). According to the trade figures for 1978, the total value of Japanese exports to Latin America was 6.62 billion dollars, while imports were valued at 3.05 billion dollars which indicates that the imports did not reach even half of the 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 decrease. However, the Japanese shares of total exports and imports as seen from the Latin American side rose

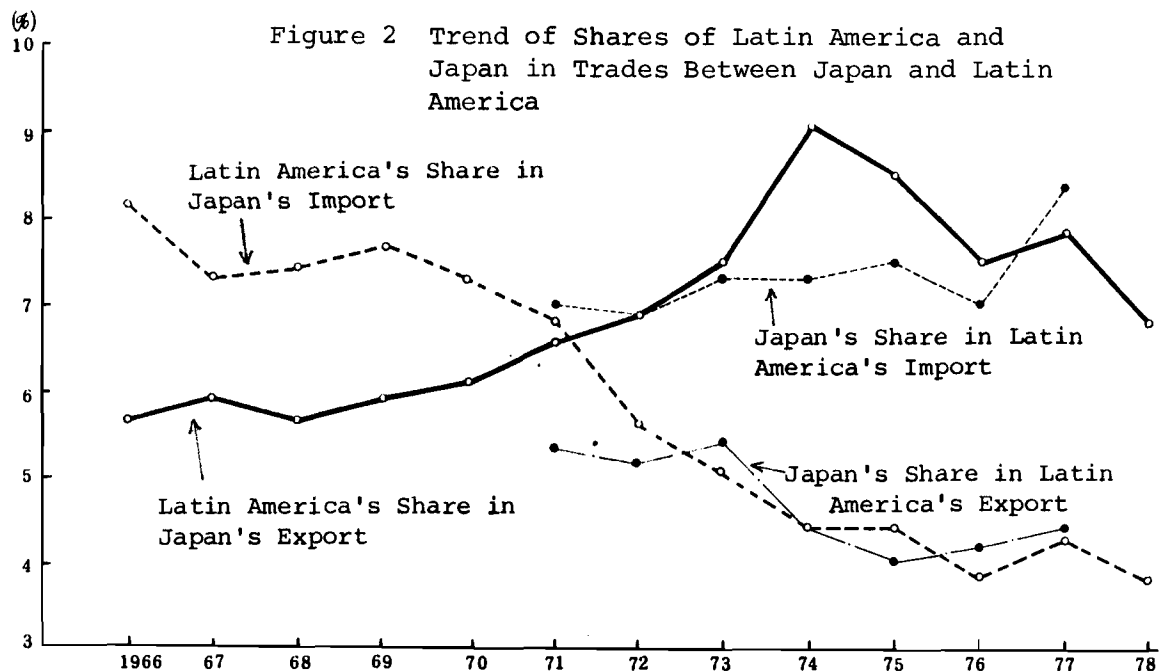
⁷ Tomás Sepúlveda-Whittle, International Maritime Transport in South America (E/CEPAL/R.213, Rev.13), December 1979.

⁸ Manual of Shipping Documents for Latin American Ports (prepared by the OAS/ECLA Transportation Program, 15 April 1980).



from 3.3% and 3.8% respectively in averages of 1961-1966 to 4.7% and 7.3% respectively in averages of 1971-1977 which shows a large increase of the Japanese share of imports. The share of the total imports from Japan for Latin America has tended to increase since 1974 (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. Among the different types of goods, the same figures was 5.8% for bulk cargo and 4.3% for general cargo. On a ton-mile basis, the above-mentioned rates were 9.5%, 10.1% and 8.3% respectively or about the double of the former, reflecting the



Source: 1) As for Japan, Tsusho-Hakusho 1976 & 1979.
 2) As for Latin America, IDB, Economic and Social Progress in Latin America, 1978.

long distance between Japan and Latin America. The imports from Latin America to Japan accounted for 6.8% of the 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 figures were 12.7%, 25.4% and 7.7% respectively. Imports of bulk cargo from Latin America accounts for one quarter of the total from all over the world (Table 4).

With respect to the trade conditions with the five Andean countries and Brazil which are the subjects of this study, the total value of exports from Japan to the Andean countries in 1978 was 907.5 million dollars (13.8% of all exports to Latin America) and the value for Brazil was 1,252.5 million dollars (19.2% of the total). The total value of imports of Japan was 797.4 million dollars for the Andean countries (26.2%) and 786.9 million dollars (25.8%) for Brazil. Exports to Brazil are 1.4 times and imports from Brazil are about the same as those for the five Andean countries together. Therefore, the Japanese trade balance is 110 million dollars for the Andean countries, whereas 465.5

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 (5.3%)	356 (9.5%)	566,400 (6.8%)	3,148 (12.7%)
Bulk Cargo	48,200 (5.8%)	241 (10.1%)	268,300 (13.8%)	1,526 (25.4%)
General Cargo	24,400 (4.3%)	115 (8.3%)	23,200 (4.4%)	131 (7.7%)
Oil	-		274,900 (-)	1,491 (-)

Source: Ministry of Transport, NIHON KAIUN NO GENJYO (The White Paper on Japan's Maritime Transport) 1979.

Notes: 1) () indicate the shares of Latin America.

2) Bulk cargo include, as for export, steel, fertilizer, cement automobile, and as for import iron ore, coal, timber, grain, sugar, animal feed, soybeans, pulp, phosphato, salt, scrap, non-ferrous metals, cali-salt, chips and pig iron.

million dollars for Brazil. Among the changes in the itmes exported to and imported from both areas (value basis), exports from Japan are mainly heavy and chemical industry products in both areas, while a large percentage of imports to Japan are raw materials and foodstuffs. In 1978, imports from the Andean countries consisted of 54% raw materials and 17% foodstuffs, and the same figures for imports from Brazil were 64% and 21% respectively, with the percentages being higher for Brazil. A high percentage of these raw material were textile materials, and most of the foodstuffs were meat and fish. However, when the trade statistics for 1978 are compared with those in 1969, ten years previous-ly, structural changes can be seen although they are very gradual. The share of exports of light industry products from Japan to Latin America has decreased, while the share of exports of processed goods (industrial products) from Latin America to Japan has increased. The export of light industrial products from Japan has 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 factors in this increase were metal products and machinery. However, the share of imports of processed goods (industrial products) increased from 13.5% in 1969 to 19% in 1978. Among the imports from the Andean

countries, the share of processed goods in the same period increased from 22 to 29%, while that for Brazil increased from 10 to 15.6%.

(Table 5 & 6; the types of the total exports and imports for both areas are given in section II-3; for goods which are susceptible to containerization, refer to III-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 the exported 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

(1) Liner market

The liner market between Japan and the Andean countries is characterized by an almost complete monopoly exercised by conference vessels. Among the conferences from Japan to Latin America shown in Table 7, those operating toward the Andean countries are the Japan/West Coast South America Freight Conference and the Japan/Latin America Eastbound Freight Conference. The former consists of 11 shipping companies and connected 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 Valparaiso (Chile), though they differ depending on the companies. The latter conference links Japan and Korea and the countries of Central America, Panama, the Caribbean Sea and the West Indies. Transshipment of cargoes are made to Mexico and the Andean countries.

For the voyage from the Andean countries to Japan, there is the West Coast South America/Japan Freight Conference which corresponds to the

Table 5 Japan's Trade with Latin America (1969)

(1,000 dollars)

Export				Import			
	Latin America				Latin America		
		Andean	Brazil			Andean	Brazil
Foods	12,664 (1.34%)	347 (0.24%)	260 (0.22%)	Foods	327,884 (28.21%)	67,478 (14.06%)	36,230 (24.43%)
Fuels	2,993 (0.32%)	1,040 (0.72%)	843 (0.70%)	Fuels	633,791 (54.52%)	305,902 (63.74%)	92,847 (62.61%)
Light Industry Goods	170,833 (18.10%)	26,119 (18.11%)	9,047 (7.50%)	Light Industry Goods	35,140 (3.02%)	413 (0.08%)	0 (0.00%)
Heavy & Chemi- cal Goods	754,000 (79.88%)	116,582 (80.82%)	108,931 (90.37%)	Heavy & Chemi- cal Goods	156,876 (13.50%)	104,460 (21.77%)	15,029 (10.14%)
Others	3,460 (0.36%)	160 (0.11%)	1,460 (1.21%)	Others	8,751 (0.75%)	1,670 (0.35%)	4,177 (2.82%)
Total	943,949 (100.0)	144,247 (100.0)	120,541 (100.0)	Total	1,162,442 (100.0)	479,922 (100.0)	148,283 (100.0)

Source: MITI

Note: Andean includes Bolivia, Chile, Colombia, Ecuador and Peru.

Table 6 Japan's Trade with Latin America (1978)

(1,000 dollars)

Export				Import			
	Latin America				Latin America		
		Andean	Brazil			Andean	Brazil
Foods	39,511 (0.60%)	749 (0.08%)	503 (0.04%)	Foods	988,818 (32.45%)	136,366 (17.10%)	161,550 (20.53%)
Fuels	51,449 (0.78%)	29,851 (3.29%)	5,426 (0.43%)	Fuels	1,371,472 (45.01%)	427,397 (53.59%)	500,779 (63.63%)
Light Industry Goods	396,745 (5.99%)	84,993 (9.37%)	39,597 (3.16%)	Light Industry Goods	47,295 (1.55%)	7 (-)	26 (0.003%)
Heavy & Chemi- cal Goods	6,108,950 (92.27%)	788,720 (86.91%)	1,202,133 (95.97%)	Heavy & Chemi- cal Goods	583,362 (19.14%)	232,349 (29.14%)	122,799 (15.60%)
Others	23,985 (0.36%)	3,154 (0.35%)	4,879 (0.39%)	Others	56,366 (1.85%)	1,333 (0.17%)	1,840 (0.23%)
Total	6,620,641 (100.0)	907,467 (100.0)	1,252,536 (100.0)	Total	3,047,313 (100.0)	797,452 (100.0)	786,994 (100.0)

Source: MITI

Note: Andean includes Bolivia, Chile, Colombia, Ecuador and Peru.

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 Rica & 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.

above-mentioned conference. Conference vessels have a monopoly on 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.

For journeys in both directions between Japan and Brazil, there is the Brazil/Far East/Brazil Freight Conference. 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.

In these conferences, Latin American shipping companies are important members and the monopolistic position of the conference companies is protected against non-conference ships by law which assures stabilized rate levels.⁹ 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.

(2) Tramp market

Bulk materials such as iron ore, coal and grain are carried by specialized cargo vessels of outsiders for which special contracts are made with the shippers. This tramp service is important because of its big volume as shown in Table 4.

In the tramp market, liper-type multipurpose vessels are used in accordance with market conditions. Such ships are intended to improve the irrationality of 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, and they are expanding. Such ships can handle simultaneously 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.¹⁰ Liper-type vessels can deal with different types of cargo because of the special technological structure which will be described later.

9 However, Sepúlveda-Whittle pointed out that the constant rise in liner rates affected adversely Latin American countries. Sepúlveda-Whittle 1979, *ibid*.

10 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 heavens, and employ Greek, Taiwanese, Indian, Philippino and other cheap labour for their crew. They are extremely competitive in (to be continued)

3. Maritime Transport Technology

The liners used on the outward voyages are grouped, from technological point of view, into conventional-type vessels and 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 largely have facilities for containers and frozen goods, tanks for liquid cargo and the capacity to carry heavy cargo (of more than 50 tons). The tramps 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 big-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 freights for bulk are decreased by triangular transport with oil.

the charter market. Liner companies of the developed countries will charter a liner, advise the name and schedule of the vessel to the shipper, and they 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 liner 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 departed from a Japanese port does not necessarily return to Japan, but often travel to other countries.

The technical characteristics of the liper-type multi-purpose vessels involve with 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.

Next, we see the imbalance between imported and exported goods in the Andean countries and Brazil and its effects on the technology of maritime transport. Because of the lack of statistics limited to Japan and the study area, the general structural trends of each type in total exports and imports in the region will be observed. Concerning the types of goods imported and exported in this area, there is in general a major imbalance between imports and exports, and especially the wide-ranging differences in goods for each country, especially for the Andean countries. For example, in the case of the percentages of solid bulk exports among the total exports of each country, the volume reached 74% for Chile, 88.3% for Peru and 87.4% for Brazil in 1977 (Table 8). In the case of Brazil, most of this was iron ore, with some soybeans, 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 remarkably hinders the efficient use of port facilities and causes an increase in maritime transport costs.

However, in the case of general cargoes only, there were 3,920 thousand tons exported and 3,850 thousand tons imported in 1977 in four Andean countries, which is almost balanced. This is one key 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 I. Here, the current condition of maritime transport in the Andean countries and

Table 8 Commodity Structures of Trades

		Chile (1,000 ton)					
		1976		1977		1978	
		Export	Import	Export	Import	Export	Import
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	3,150.22	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					
		1976		1977		1978	
		Export	Import	Export	Import	Export	Import
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					
		1976		1977		1978	
		Export	Import	Export	Import	Export	Import
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					
		1976		1977		1978	
		Export	Import	Export	Import	Export	Import
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	n.a.	n.a.
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					
		1976		1977		1978	
		Export	Import	Export	Import	Export	Import
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.

Brazil will be discussed from the standpoint of the ships currently possessed. As of January 1, 1979, the Andean countries have 114 and Brazil and 117 ocean-going ships, which is about the same, but when tonnage is compared, the Andean countries have 1,794 thousand tons, while Brazil has 4,335 thousand tons which is about 2.4 times more. It is evident that 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 younger than that in the Andean countries. The average ship age is 5.6 years.

Among the various types of ships, the multi-purpose ships owned by the Andean countries account for 158 thousand DWT, 8.8% of the total, but in Brazil, they are twice of the Andean with 327 thousand DWT, but this is 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 figure for Brazil. The overall TEU volume are 8,802 units for Brazil and 7,083 for the Andean countries which is not a big difference. 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 (Table 9).

III. 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, the following rough assumptions can be made concerning the future from what has occurred in the past [II-1 and Tables 5 and 6]: (1) The import of bulk materials from South America will continue to increase. Among these materials, there will be increases in iron ore from Brazil,¹¹ and

¹¹ Long-term contracts of Japan to import iron ores from South American countries are as follows. (To be continued)

Table 9 Merchant Marines by Trades and Types of Vessel at 1 January 1979

(1,000 tons)									
	Units	GRT (1000 ton)	DWT (1000 ton)	Cargo Capacity (100 m3)				TEU	Average Age
				Dry	Refrig- erated	Liquid	Total		
Andean Area ^{1/}									
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
Multipurpose 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
Multipurpose 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.

Note: ^{1/} includes all vessels above 1,000 GRT in Bolivia, Chile, Colombia, Ecuador and Peru.

grain (soybeans, 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 industrial products in Japan especially from the Andean countries and Brazil, the share will continue to increase in the future under conditions of increasing future competitiveness. The share of Latin America in the case 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 suitable ships are selected in the future from the long-term viewpoint with consideration given to these changes, the use of the following types of ships will be the most efficient based on the prerequisite that necessary and sufficient maritime cargo movement is assured. 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) for bulk materials such as iron ore and grain, large-scale combined cargo ships or special bulk carriers; (2) for materials with a particular shape such as wood and chips, special wood carrying ships and special cargo ships for 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

	(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.

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 the prospects for the introduction of combined iron ore and grain carrier 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 to handle the small amount and highly diversified cargoes. Since such ships can handle both bulk materials and general cargo, they should contribute to an improvement in the participation ratio which is required in Latin American countries. Such vessels as the previously mentioned Liper type conform to such aims but conventional type vessels with container hatches, derricks for heavy cargo, etc. can also meet such requirement.

The use of RO/RO vessel, one type of multi-purpose vessel which can handle such cargoes as bulk materials, automobiles, containers and steel, is considered as one step in 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. Therefore, 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 system" and various preparations such as provision of the related facilities are necessary.

(2) Selection of Ships for Bulk Cargo¹²

It is aimed here 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.

12 This is the essence of a study done by International Development Center of Japan (IDCJ) in 1979. The author of this Chapter participated in this study.

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 programs and the establishment of export systems, are extremely important in conjunction with the more efficient maritime transport mentioned above.

(3) Prospects for Containerization

1) 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.

Table 10 Progress of Containerization of
the Routes from Japan (March 1978)

Containerized Routes	Years of Inauguration	Days Required	No. of Companies	No. of Vessels	Gross Tonnage	No. of Containers		Average Types of Vessels GT	No. of Containers
						TEU	%		
Canadian Route	Aug 1968	30	6	12	254	11,053	19.5	21,181	921
USA-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.

Australia has similar trade patterns to those of Latin America, but full container vessels were already operating there in 1969.¹³ The annual number of containers handled on the Australia-Japan route in 1969 was 65 thousand (TEU), but at present there has been a 73% increase to the 110 thousand. With the revolution in container ships occurring during this period, the ANL Company introduced an 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 in service by AJCL.

¹³ However, we should not overlook the fact that there are important differences with respect to port labour costs in Latin American and Australian ports, with respect to the fact that Latin America comprises separate countries each with nationalistic tendencies that are much more potent than the equivalent tendencies in the various Australian states, etc.

In comparison, containerization has been greatly delayed in Latin America. As was described in I-2, no countries in South America, with the exception of the Caribbean region, had any full container or LASH vessels and there were only two RO/RO ships as of 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 ECLA-OAS study performed in May, 1979, the ideas of the South American countries concerning utilization have changed considerably in the last 10 years. They are well aware of the items involved and the utilization of containers is increasing.¹⁴ The ports in each country are being equipped to handle containers. For example, a container terminal is under construction in Santos Port 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 Port in Ecuador.

Sepúlveda-Whittle have made estimate of 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 (Table 11). According to this estimate, there was a 70% increase in exports susceptible to containerization from Japan from 100 thousand tons in 1970 to 170 thousand tons in 1975, while the imports to Japan varied between 40 and 60 thousand tons in the same period and did not show much 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, is that the port for full container ships should be equipped in each country because of its own official maritime transport

14 Sepúlveda-Whittle, 1979, *ibid.*

Table 11 Estimate of Containerizable Goods in
the Route Japan-Andean Countries

	Japan's Export		Japan's Import	
	(1,000 ton)	(TEU)	(1,000 ton)	(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 Latin America, 1978, and CEPAL, Minuta sobre Reunión con el Prof. Akio Hosono del 22 Noviembre 1979.

policies and national shipping companies. The problem of the increase of participation ratio which is stressed in the Andean countries may have a reverse effect on containerization. Shipping companies in the Andean countries do not have so far the sufficient technical experience required for the operation of 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, 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 allotted to the leading routes in Europe and North America prior to containerization are still active in the 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 would 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 it in conference rules because of strong demands by the shippers, but that cannot be said to have got progress.

2) Prospects for containerization

Under the above conditions, it does not appear that services by full container vessels will start in the next few years, but we could hardly deny the fact that containerization is a trend of the times.¹⁵ One method to cover the insufficient technical and financial resources of the Andean countries and introduce 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 diverse small sized countries to minimize costs. The following case is an example that can already be seen in 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)¹⁶:

- 1) Technically, several small countries form one unit so that port facilities for full container ships might not be better scattered 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 are searched for 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 centered on the construction of large container terminals, and the feeder ships travel the coastal routes or between the ports of the countries. Since the feeder service will be made to the ports with backward facilities, desirable ships should be those with a shallow draft and container cranes or RO/RO ships.

15 Carlos Aragón, The Development of a National Line and the Effects on its Country's Economy and Transportation System, October 1978 and hearings from him.

16 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 Valparaiso, Callao, Guayaquil, Buenaventura, Arica or Antofagasta (for Bolivia) would be selected mainly from present port conditions and geo-political reasons.

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 system. Feeder services need not be limited to ships, but road and rail transport by trailers should be studied to find out best methods. Thus, an optimum distribution condition for an integrated transport system from the production to the consumption sites will be found out.

IV. PROSPECT FOR COOPERATION IN MARITIME TRANSPORT

1. Prerequisites for Cooperation

Before investigating a cooperation system, it is necessary to clarify the basic attitudes of Japan and Latin America for cooperation.

- 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 that they recognize the development of maritime transport is indispensable for the progress of economic cooperation 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 improvements in the efficiency of cargo handling by the ships of each country, improvements in the problems of international balances by increasing freight income through increased participation as ship owners and operators, and related effects such as fostering the shipbuilding industry and effects on the land-related sectors such as bridges, steel structures, and construction and industrial machinery. In expanding the nation's merchant fleet, political aims to enhance national prestige and guarantee economic security cannot be overlooked. but this report is majorly dedicated to economic analysis. Therefore, there is an argument that ships with the latest technology are required for political aims. In this report, selection of ships and cooperation is discussed mainly from the standpoint of transport economy.

- 2) When considering the possibility of cooperation with Japan, it is essential to start from the current conditions of Japanese shipping and shipbuilding industries. In 1978, the Shipping and Shipbuilding Rationalization Council, an advisory organ of the Minister of Transport, prepared a report which stated that the Japanese shipping industry is currently in a period of structural change where it is necessary to change from the former "offensive shipping" to "defensive shipping." It was indicated that Japanese ships must regain international competitiveness and mainly because of the sharp increase in Japanese personnel costs, it is necessary to establish systems 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 is rapidly losing international competitiveness and short-term assistance measures are necessary to achieve recovery. From the long-term viewpoint, rationalization of total costs and especially personnel costs, will be required; high technical levels such as in the electronics industry will have to be introduced in the shipping industry, and conversion to a technologically-intensive system industry was advocated.
- 3) Concerning the promotion of cooperation in shipping from Japan to Latin America, it is also necessary to consider that Japan has a favorable balance of trade as indicated in II-1.

Now let's turn to major topics. The types of ships required by the Andean countries and Brazil were indicated through the studies in the previous section. Therefore, the item discussed here will be the method of Japanese cooperation in making the Andean countries and Brazil shipowners and operators.

- 1) The first point to investigate is what capacities these countries have to cope with such problems as 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 industrializing country with experience in building large ships and is grouped in the 3rd 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 cooperation carried out by Japan in the past and based on this experience, screen the items for which cooperation should be performed and those for which the approach should be changed.

- 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 it is possible for Latin America if the development of related industries has reached a certain stage.¹⁷ ISHIBRAS in Brazil is a good example of a successful shipbuilding joint venture. In addition, it is necessary to have the testing capacity using software technology to select the best performance efficiency of 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 it was changed into a technical cooperation agreement. This indicates that cooperation in the shipping field should be more realistic in the form of technical cooperation agreements rather than joint ventures. The Kawasaki Line is also advising the CPV Company of Peru on liner services at the captain level which is highly evaluated.
- 4) In addition, on the governmental level, requests are increasing not only for technical cooperation by such means as the dispatch of shipping experts, but also for economic cooperation in the

17 Related industries required for shipbuilding are, for example, material industry which provides steel plates, angles etc., industry that provides fittings such as bulbs, pipes, etc., engine, and castings such as helm, stern frames, etc. Shipbuilding requires, as a prerequisite, certain levels of development of the above mentioned industries.

form of loans for the purchase of ships to foster national merchant fleets. In October, 1978, a shipping seminar was held at the request of the ESCAP countries with those in charge of shipping policies and management in attendance and this was highly evaluated.

2. Fields and Methods of Cooperation

Based on the above discussion, the following can be considered as the fields and methods of cooperation by Japan concerning shipping and shipbuilding in the future in Latin America (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 (can be limited to the Andean countries), and specialists from such organizations as those in the United Nations, ECLA 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.¹⁸ 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 on maritime cargo movements to prepare for selection of ships suitable for the region and containerization, such as a joint study with the ECLA, should be considered. v) On a private basis technical cooperation agreements are considered as suitable forms of cooperation.
- 2) In the case of shipbuilding; i) The conventional policy is to provide government loans and technical cooperation as well as

18 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.

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 at both the ship design and production stages for the construction of such ships as conventional and multi-purpose vessels can be considered in the Andean countries.

- 3) With respect to containerization, cooperation from Japan in both the software and hardware fields can be considered, but this is sometimes impossible to perform all at once, 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 cooperation and preparing 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 correct common understanding of current conditions (by comparisons with other regions), problem points and the possibilities of improvement.

Second Stage (Transient 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 cooperation system will be established using full container ships, large-scale container terminals, etc. Japan will provide cooperation 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, this aspect should be strengthened more than before 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 controller (general know-how for efficient utilization of containers).

3. Cooperation 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 the profitability will decrease. Therefore, cooperation for 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 cooperation concerning ships and services.

Transport routes from local production sites to the harbors must be provided and it is also important to reduce land transport costs. In this field, Japan should upgrade its cooperation in the future with respect to such projects as export corridor programs and integrated transport systems.