ECONOMIC DEVELOPMENT AND THE STRUCTURAL CHANGE OF TRADE IN THE PACIFIC ASIAN REGION

TAKUO TANAKA
HIROSHI OSADA
KINYA ONODA

INTRODUCTION

THE last two decades of the Pacific Asian region have seen considerable change in the international trade patterns. In particular, the export of light manufacturing goods by the newly industrializing countries (NICs) of Asia has grown rapidly, and they are now shifting over to the export of heavy industry goods. The ASEAN countries are now also exporting processed primary commodities and some light manufacturing goods. To explain these changes in trade pattern and to forecast future movements, the linkage between trade patterns and economic development, especially via industrial structure, will have to be made more readily understandable.

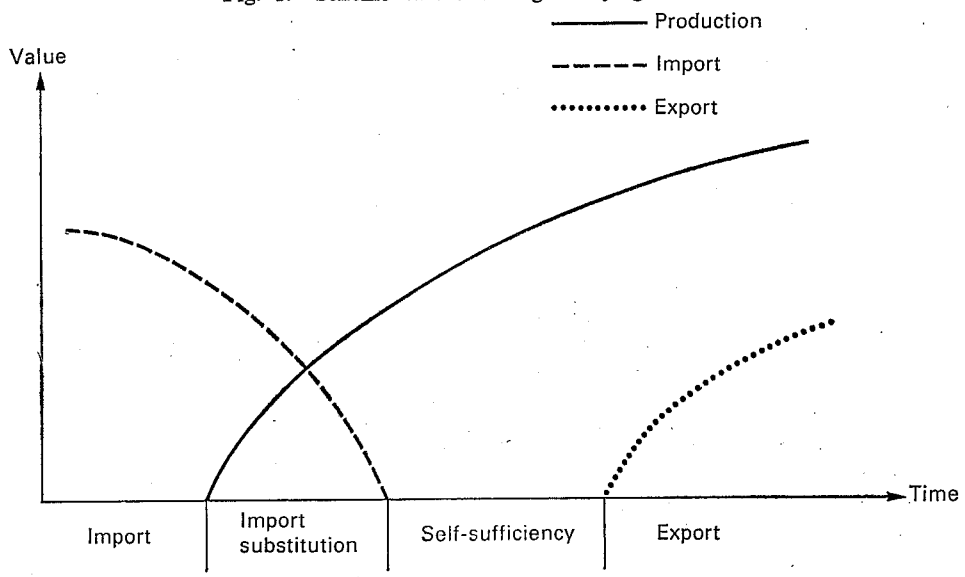
Existing theories do not provide adequate clarification. The well-known Heckscher-Ohlin theory is too abstract due to its direct linkage between factor endowments and trade patterns, and it is difficult to empirically test in a multi-sector world. Vernon's product life cycle theory [7] and Akamatsu's "wild-geese-flying pattern" (*gankō keitai*) [1] are two of the few studies explicitly dealing with the linkage between industrial growth and changing trade patterns. The "wild-geese-flying pattern," in particular, proposes a standard growth scheme for an industry from the import to the export stage, and is easily applicable to empirical studies. But, both theories are basically one-sector analyses and do not relate much to change in industrial structure.

The purpose of this paper is to expand the one-sector analysis to a multi-sector analysis, and to clarify the linkage between economic development represented by per capita income, industrial structure, and foreign trade patterns based mainly on the analysis of the 1975 international input-output table for ASEAN countries [5], which is hereafter referred to as the ASEAN I-O Table. This cross-sectional observation of countries at various stages of economic development in 1975 also facilitates forecasting future directions in industrial and trade structures for each ASEAN member.

Section I presents the framework of analysis and the main source of data.

This paper was first presented at the workshop on Trade and Industrial Cooperation in East and Southeast Asia, held on March 8–9, 1983 at the Institute of Developing Economies, Tokyo. Helpful comments by an anonymous referee of the journal are gratefully acknowledged.

Fig. 1. Scheme of the Wild-geese-flying Pattern



Sections II and III empirically test the relation between economic development and industrial structure and between industrial structure and trade pattern. Section IV combines the analyses of the previous two sections to explain the entire linkage. Section V reviews the features of mutual trade in the Pacific Asian region for 1975 and uses the textile industry in Korea and Thailand as a case study. The final section gives the conclusions of the analysis and points out the remaining problems.

I. ANALYTICAL FRAMEWORK AND DATA

Studies on the linkage between foreign trade and industrial structure have not developed to the stage that realistic policy implications can be drawn from them. The Heckscher-Ohlin theory explains the trade pattern determination by a factor-endowment ratio of capital and labor in a two-commodity and two-country world. However, on the one hand, the two-commodity assumption prevents direct application to a multi-commodity world and, on the other, the factor-endowment ratio is too indirect to explain industrial structure transition. The product life cycle theory and the wild-geese-flying pattern successfully explains the linkage between trade performance and development stage in a particular industry. Figure 1 shows that the wild-geese-flying pattern successfully connects stages of an industry's development with trade performance. Domestic production starts with import substitution, then reaches a point of self-sufficiency, and finally products become exportable. Moreover, Akamatsu implies that the process is initiated by light manufacturing industry and then gradually shifts to heavy manufacturing. However, empirical studies of this type are confined mostly to the case of Japan and analyses of industrial structure are not emphasized.

There are well established empirical studies regarding the transition of industrial structure in the course of economic development. Among them are the well-known contributions by Kuznets [6] and Clark [4]. Unfortunately these studies do not focus on the transition of detailed sectoral structure in manufacturing.

This paper aims to shed some light on the linkage between economic development, industrial structure, and trade pattern. Since a precise theoretical analysis at this stage is difficult, the study attempts to draw implications for the theory from empirical analysis by a sort of analytical framework rather than rigid hypothesis testing.

For convenience in explanation, the following analytical framework focuses on one-way causality from economic development to trade pattern, although a reverse feedback effect surely exists.

(1) Economic development is, in principle, a process of accumulating production factors such as capital, skill, and technology.[1] As a consequence, the factor-endowment ratios of these factors per unit of unskilled labor gradually increases. This process naturally affects the supply conditions underlying the international competitiveness of each industry.

(2) Economic development that can be measured roughly by the growth of per capita income also shifts demand structure as Engel's Law suggests. More specifically, the demand for agricultural products decreases while demand for manufactured products and services increases.[2] Even within the manufacturing sector, final demand shifts from consumption goods to durable goods. Also, for this production, demand for intermediate and capital goods increases. Thus the factor proportion required to meet demand will change; in other words, the shift from light to heavy manufacturing requires relatively more skill, capital, and technology than it does unskilled labor.

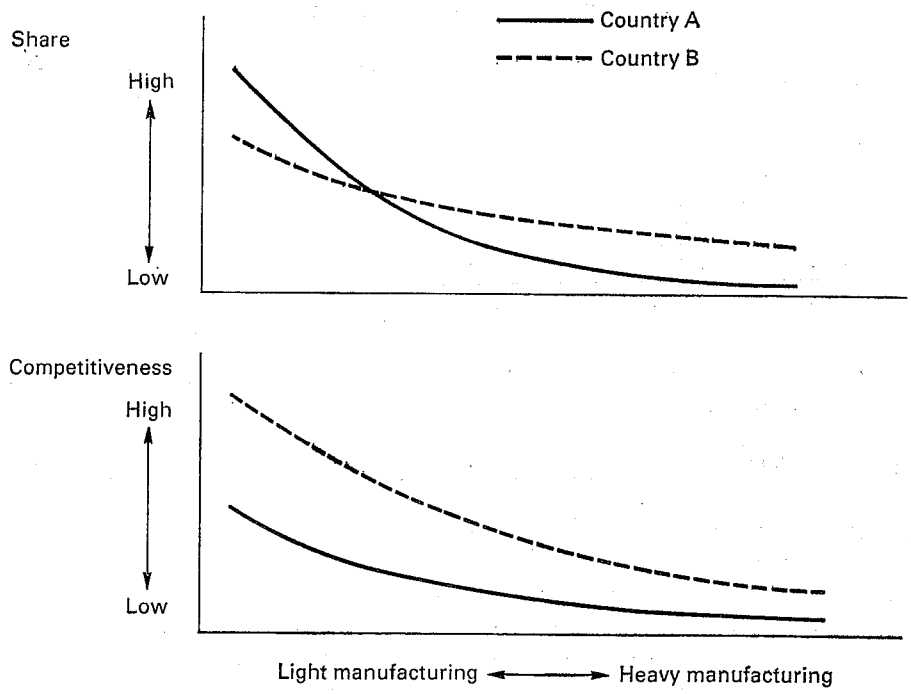
(3) Thus, we may presume that the developing countries with relatively abundant supply of unskilled labor will have comparative advantage in light manufacturing goods and that international competitiveness is stronger in industries that developed earlier due to the accumulated learning-by-doing effect.

To clarify the argument, we will give an example of two countries using Figure 2: developing country A with a low income and developing country B with a higher income. Industries are placed on the horizontal axis according to processing characteristics. Light manufacturing is close to the origin and as industry becomes heavier it moves away from the origin. The vertical axis shows, separately, an industry's sectoral share and its international competitiveness. What we would argue is that, as the graph shows, the share of light manufacturing is higher than heavy manufacturing and the strength of international competitiveness is positively related to the industry's share in each country. Moreover, we would point out that relatively advanced country B has a greater share of heavy manufacturing than country A and that each indus-

[1] Although there are other important production factors, capital, technology, skill, and unskilled labor are considered to be more relevant to the present study.

[2] Some studies point out that the share of the service sector first decreases and then increases (U shape curve).

Fig. 2. Industrial Structure and International Competitiveness



try in country B has stronger international competitiveness than its correspondent industry in country B because of earlier development.

(4) This explains how change in demand structure and factor endowment in the course of economic development becomes the driving force in the transition of industrial structure and international competitiveness. If we accept the theory, the degree of international competitiveness then determines where the industry is in the wild-geese-flying pattern scheme in Figure 1. In other words, international competitiveness determines whether the industry is located in the complete import, import substitution, self-sufficiency, or export stage. Accumulation of such analyses on all industries finally generates the country's trade pattern.

In the following sections, this analytical framework will be empirically examined based mainly on the ASEAN I-O Table. The countries covered in the table are the five ASEAN countries, Korea, Japan, and United States. Each country has fifty-six uniform industrial sectors and the table shows international commodity flow from one sector in one country to another sector in another country. For a detailed analysis of the linkage between industrial and trade structure, six industries are chosen from the fifty-six sector classification so that each represents an industrial group of different factor intensity. Also, foreign trade statistics by the OECD and the United Nations were recompiled[3] according

[3] For this processing, we used the Institute of Developing Economies foreign trade data retrieval system (AIDXT).

TABLE I

SECTORAL COMPOSITION IN MANUFACTURING IN 1975

	Indonesia	Thailand	Philippines	Korea	Malaysia	Singapore
Labor-intensive sector (%)	64	66	64	50	49	36
Food processing	49	40	47	21	31	17
Textile	10	16	10	22	5	11
Capital-intensive sector (%)	20	24	28	35	41	30
Capital- and technology-intensive sector (%)	16	10	8	15	10	34
Per capita GDP (U.S.$)	250	340	380	590	750	2,340

Sources: [5] for sector; [2] for per capita GDP.

to the input-output classification to measure the revealed comparative advantage of the six industries.

II. ECONOMIC DEVELOPMENT AND INDUSTRIAL STRUCTURE

Industrial structure differs from country to country according to the stage of economic development. In 1975 the five ASEAN countries and Korea had a 20 to 30 per cent share of GDP for agriculture, forestry, and fishery except for Singapore which had 10 per cent. The manufacturing sector has a slightly higher share than agriculture in Korea and Malaysia. Indonesia, Thailand, and Philippines have a higher agricultural share. The ranking of countries according to industrial development coincides with ranking according to per capita income. Per capita income is lowest in Indonesia at U.S.$250 and rises, in order, in Thailand, Philippines, Korea, Malaysia, and Singapore.

Similar observations were made on sectoral composition in manufacturing. There are twelve manufacturing sectors in the twenty-four sector aggregated ASEAN I-O Table. If we regroup them into three to maintain relevance to our analysis of factor intensity, the sectors are.[4]

1. Labor-intensive: food processing, textiles, wood products, miscellaneous.
2. Capital-intensive: pulp, chemical, petroleum, rubber, nonmetallic and metallic products.
3. Capital- and technology-intensive: machinery and transportation equipment.

The share of these groups in manufacturing and per capita GDP are summarized in Table I. In reading this table, keep the following reservations in mind.

(1) In Indonesia 16 per cent of the capital- and technology-intensive sector is mostly assembly automobile, which is protected by import regulations.

(2) In Malaysia 41 per cent of the capital-intensive sector reflects the large share for tin and rubber processing. This is an industrial structure largely influenced by favorable endowment of natural resources.

[4] Skill factors are taken into account in the next section by disaggregation of machinery into skilled-labor-intensive electrical machinery and capital- and technology-intensive industrial machinery.

(3) In case where a country's economic size is rather small as is Singapore's and Malaysia's, it is impossible to have an entire set of industries due to scale disadvantages. Thus, unbalanced industrial composition is more exaggerated in those countries.

(4) Although the denominator of the share adopted here is the total value added of manufacturing rather than GDP, the results will not affect the observations much in this case.

Taking all these reservations into account, observations from the table are:

(1) The share of the labor-intensive sector decreases as per capita income rises. Indonesia, Thailand, and Philippines have shares of more than 60 per cent, while the others have shares of less than 50 per cent. This tendency is more obvious if we compare the shares for food processing. In Indonesia, Thailand, and Philippines, food processing is more than 40 per cent of manufacturing. This implies that the stage of industrial development is basically the same in Indonesia, Thailand, and Philippines, and also that they are at a lower stage of industrial development than the other.

(2) Singapore seems specialized in capital-intensive or capital- and technology-intensive sectors. This reflects its economic size and a higher stage of industrial development.

(3) Thailand and the Philippines have quite similar patterns except for Thailand's specialization in textiles.

(4) Although Korea ranks lower than Malaysia in per capita terms, the Korean industrial structure is more developed with a higher share of capital-intensive and capital- and technology-intensive sectors when it is noted that the 41 per cent of Malaysia's capital-intensive sector is mostly the simpler tin and rubber processing.

In summary, these observations seem to support the assumption made through Figure 2: Industrial structure is biased toward capital-intensive and/or capital- and technology-intensive sectors when a country is more developed economically.

III. INDUSTRIAL STRUCTURE AND TRADE PATTERN

The analytical framework of Section I presumed that economic development changes the industrial structure of an economy and the international competitiveness of each industry in that economy. Such changes were conceptually linked to changes in trade performance as shown by Figure 1. This section uses three indicators of trade performance to empirically examine the process. The self-sufficiency ratio is the percentage of domestic demand filled by domestic supply and it indicates the degree of import substitution. The revealed comparative advantage (RCA) advocated by Balassa [3] indicates the degree of international competitiveness which is revealed by the export performance.[5] The export-dependency ratio measured as the percentage of exports in domestic production indicates the importance of exports to an industry's production. In addition, shares for intermediate inputs supplied respectively by the home

[5] An industry is internationally competitive by definition, if the index exceeds unity.

country, Japan, United States, and other ASEAN countries are calculated from the ASEAN I-O Table to see how deeply the industry is rooted in the country and how dependent it is on other countries.

Figure 1 shows that we may presume that the self-sufficiency ratio starts from 0 per cent and approaches 100 per cent as import substitution progresses. The RCA gradually increases, but at less than unity, until an industry's product becomes internationally competitive. This indicator becomes greater than unity and continues to increase as the industry gains international competitiveness. It may also be natural to assume that an industry's share in manufacturing increases as it approaches the export stage, all other things being equal. In other word, in relation to the argument of industrial structure, we may say that an industry with a larger share has a better export ability.

For the present study, six representative industries were chosen from the fifty-six sector classification of the ASEAN I-O Table. All are of great importance to ASEAN countries as potential export or as key industries. In choosing the sectors, we grouped the industries into four categories according to factor intensity. Textile industry is again disaggregated into three groups according to the stage of processing, i.e., downstream, midstream, and upstream.

1. Unskilled-labor-intensive:
   (1) Downstream: Wearing apparel.
   (2) Midstream: Weaving and dying.
   (3) Upstream: Spinning.
2. Skilled-labor-intensive: Electrical machinery and apparatus.[6]
3. Capital- and technology-intensive: Industrial machinery and equipment.
4. Capital-intensive: Iron and steel.

We should also point out that, in the textile industrial complex, an industry will be more capital-intensive as it becomes more upstream.

The measured indicators are summarized in Table II. It enables us the cross-sectional comparison of industries in each country and the cross-sectional comparison among countries at the same time. Major findings from the table could be summarized as follows:

(1) With self-sufficiency ratios of 80 per cent to 100 per cent, the textile industry (from spinning to wearing apparel) in the six countries seems to have left the import substitution stage. The exception is Singapore, which imported large amounts of textile due to its shift in industrial structure to the next higher stage. However, export performance differs from country to country. All ASEAN countries except Indonesia exported large amounts of wearing apparel and woven fabrics but not spun materials. This phenomenon is well explained by the level of RCAs, which declines as the production process approaches upstream. Korea has a strong comparative advantage for all three industries with RCA indices of more than 4. The RCA indices for Thailand are: 0.3 in spinning and 2.1 and 1.6 in the others. This clearly shows that the Thai spinning industry has not yet reached the exportation stage. Finally, the domestic-supply ratios of intermediate goods showed sharp differences for

[6] This excludes electrical machinery for industrial use.

the three textile industries. Common to the ASEAN countries is that the percentage drastically goes down as the process approaches upstream (spinning). Japan is dominant among foreign suppliers, for wearing apparel and weaving and dying. In spinning, the weight of the United States increases as a cotton supplier. Purchase from other ASEAN countries are still very small.

(2) In the sequence of industrialization, the electrical-machinery industry stands between unskilled-labor-intensive industry and capital-intensive industry. We may regard an industry as skilled-labor-intensive if the main products are for domestic use. Electrical machinery produced in Indonesia, Philippines, and Thailand is mainly light electrical machinery, while in the other three countries it is more sophisticated. Table II shows the situation very well. The domestic-input ratio and self-sufficiency ratio are lowest in Indonesia (28 per cent, 37 per cent), highest in Thailand (72 per cent, 59 per cent) and the Philippines (85 per cent, 66 per cent), and at intermediary levels in Malaysia (56 per cent, 43 per cent), Singapore (53 per cent, 54 per cent), and Korea (58 per cent, 66 per cent). On the other hand, the export-dependency ratio and RCA indices increase monotonically. This means the first three countries are at the import substitution stage of light electrical machinery. However, other countries are at the same stage in the import substitution of more sophisticated electrical machinery and the export of light electrical machinery. RCA indices for Malaysia, Singapore, and Korea were 0.73, 2.47, and 2.09, respectively.

(3) The industrial machine industry requires both capital and high technology. Therefore, most ASEAN countries are still in an early stage of import substitution with self-sufficiency ratios from 13 per cent to 32 per cent, and RCA indices of less than unity. The higher export-dependency ratio in Malaysia and Singapore is probably because of the larger composition of low grade industrial machinery. Here again, Japan is the main foreign supplier of raw materials.

(4) Due to the sector classification of the ASEAN I-O Table, the iron and steel sector includes primary and secondary iron and steel. This is the reason for the rather high self-sufficiency and domestic-input ratios in the Philippines and Thailand. In primary iron and steel, only Malaysia and Korea had mills at that time. Of the two, Korea had a higher RCA index (0.82) and export-dependency ratio (18.3 per cent) than Malaysia.

Next, let us review all these findings based on the linkage between trade patterns and industrial structure. The shares of the six industries are also given in the last column of Table II. Generally, the industry with a larger share in each country has a higher RCA and self-sufficiency ratio.

To show this more easily, the ranking of these indicators in each country is summarized in Table III. Iron and steel is dropped from the comparison since the details for the industry differ so much between countries. Due to the detailed industrial classification and the special economic characteristics of Singapore and Malaysia, the ranking is slightly different for the three indicators. However, we may conclude that they are basically similar. Thus, our assumption of a relation between industrial structure and trade pattern seems to be supported by the data.

TABLE

PERFORMANCE OF SIX INDUSTRIES

Industry and Country	Indicators	Self-sufficiency Ratio* (%)	Export-dependency Ratio† (%)
Wearing apparel	Indonesia	99.0	0.9
	Philippines	100.0	37.8
	Thailand	99.8	7.0
	Malaysia	89.9	34.6
	Singapore	43.5	24.2
	Korea	100.0	48.2
Weaving and dying	Indonesia	86.7	0.0
	Philippines	88.5	0.1
	Thailand	91.0	10.5
	Malaysia	42.9	29.3
	Singapore	100.0	23.8
	Korea	86.4	31.0
Spinning	Indonesia	92.3	0.4
	Philippines	68.5	3.7
	Thailand	96.8	3.5
	Malaysia	96.0	5.3
	Singapore	28.6	68.4
	Korea	97.4	18.1
Electrical machinery and apparatus	Indonesia	36.6	8.0
	Philippines	66.2	15.7
	Thailand	58.9	11.9
	Malaysia	43.1	56.8
	Singapore	53.7	50.1
	Korea	65.5	37.7
Industrial machinery	Indonesia	21.6	1.2
	Philippines	19.5	13.4
	Thailand	31.4	4.5
	Malaysia	14.8	52.1
	Singapore	13.8	59.8
	Korea	31.8	17.5
Iron and steel	Indonesia	8.2	0.0
	Philippines	63.7	4.2
	Thailand	62.8	2.4
	Malaysia	45.6	10.5
	Singapore	8.8	36.6
	Korea	75.9	18.3

* 1−(Import/Domestic demand). † Export/Domestic production.

II

IN ASEAN AND KOREA

RCA	Supply of Intermediate Inputs (%)				Share in Manufacturing (%)
	Domestic Supply	From Japan	From U.S.A.	From ASEAN	
0.03	87.1	4.8	0.2	0.5	2.6
0.79	93.2	2.9	0.9	0.0	2.5
2.10	90.0	4.0	0.3	0.1	3.8
0.67	55.2	16.6	1.3	2.0	1.9
1.05	64.3	4.0	2.1	3.6	7.3
10.45	80.4	15.8	0.6	0.2	5.5
0.0	67.6	10.5	0.8	1.7	3.6
0.1	54.6	14.6	12.7	0.3	2.5
1.6	90.6	3.7	0.4	0.4	3.4
0.5	82.4	3.6	1.2	2.4	0.6
1.0	63.2	7.9	4.4	3.2	0.5
4.8	91.4	5.1	0.7	0.1	4.6
0.0	31.4	7.8	28.4	1.8	1.2
0.0	74.5	4.5	6.6	0.0	1.3
0.3	35.4	14.0	5.1	0.0	2.5
0.2	48.9	12.4	4.4	2.1	0.9
0.5	51.3	8.1	15.1	1.6	0.3
4.1	70.0	5.3	18.0	0.0	4.3
0.03	28.2	22.8	5.4	3.3	0.7
0.03	85.1	4.1	3.3	0.3	1.5
0.25	71.9	8.3	1.0	0.9	1.5
0.73	55.7	12.9	8.0	6.3	5.7
2.47	53.4	10.8	15.1	2.7	15.3
2.09	57.5	19.1	13.1	0.5	7.4
0.02	27.5	24.8	11.1	3.9	1.9
0.03	76.7	7.4	5.1	0.2	2.0
0.03	48.2	23.4	1.7	1.0	2.3
0.32	44.8	13.0	6.8	2.3	2.2
0.59	45.8	12.2	13.1	3.8	5.3
0.20	77.1	10.5	4.8	0.4	2.8
0.0	52.3	25.7	2.3	1.5	0.2
0.01	40.5	32.3	3.7	0.2	3.1
0.07	62.4	16.7	1.5	0.4	2.7
0.03	75.5	5.6	7.3	1.4	1.5
0.29	30.0	34.4	13.0	1.3	5.3
0.82	66.9	15.1	7.1	0.2	3.1

TABLE III

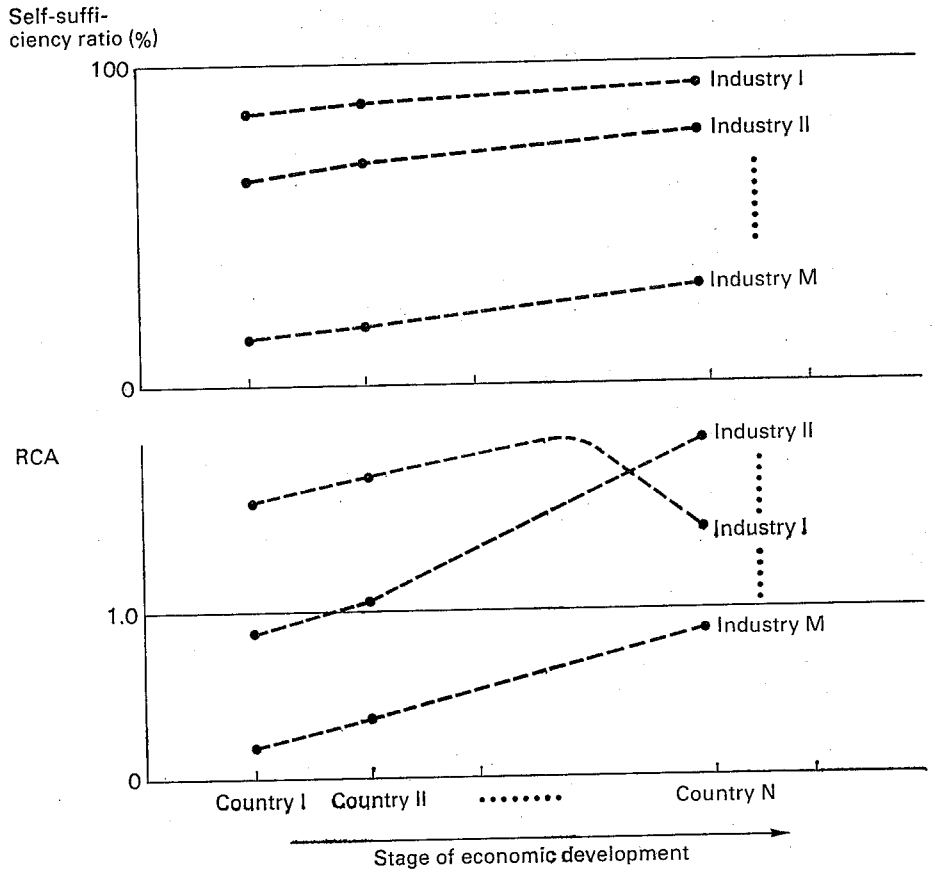
RANKINGS OF INDUSTRIAL SHARE AND TRADE PERFORMANCE

	Wearing Apparel	Weaving and Dying	Spinning	Electrical Machinery	Industrial Machinery
Indonesia:					
Industry share in manufacturing	2	1	4	5	3
RCA	1	4	4	1	3
Self-sufficiency ratio	1	3	2	4	5
Thailand:					
Industry share in manufacturing	1	2	3	5	4
RCA	1	2	3	4	5
Self-sufficiency ratio	1	3	2	4	5
Philippines:					
Industry share in manufacturing	1	1	5	4	3
RCA	1	2	5	3	3
Self-sufficiency ratio	1	2	3	4	5
Malaysia:					
Industry share in manufacturing	3	5	4	1	2
RCA	2	3	5	1	4
Self-sufficiency ratio	2	4	1	3	5
Singapore:					
Industry share in manufacturing	2	4	5	1	3
RCA	2	3	5	1	4
Self-sufficiency ratio	3	1	4	2	5
Korea:					
Industry share in manufacturing	2	3	4	1	5
RCA	1	2	3	4	5
Self-sufficiency ratio	1	3	2	4	5

IV. THE LINKAGE BETWEEN ECONOMIC DEVELOPMENT AND TRADE PATTERN

The empirical results of Section II support the contention on a linkage between economic development and industrial structure and the results of Section III endorse the contention on a linkage between industrial structure and trade pattern. We are now able to explain the fundamental relationship between economic development and trade pattern as observed historically. This, of course, is accompanied by certain reservations. For example, the relationship will be disturbed if the industrial structure is natural-resource-based as is Malay-

Fig. 3. Scheme of Development and Trade



Note: Less developed countries catching up in industrialization is causing industry I in country N to lose its competitive position.

sia's and if economic size does not allow so-called one-set industrialization as in Singapore. In other words, the thesis is more applicable to Indonesia, Thailand, Philippines, and Korea. Our framework does not fit the developed countries, which has already lost the comparative advantage in labor-intensive goods.

In summary, our empirical analysis allows us to draw a scheme as in Figure 3. The graph contains all important variables. Self-sufficiency ratio as an indicator of import substitution and RCA index as an indicator of export performance are measured separately on the vertical axis, and the sequence of countries (I, II, . . ., N) representing the stage of economic development is measured on the horizontal axis. Industries (I, II, . . ., M) are represented by dotted lines. In the graph, an industry at industry I is unskilled-labor-intensive and becomes more intensive in skill, capital, and technology as it approaches industry M. Moreover, if we assume that country I today will become country II tomorrow as its economy develops, we will obtain important implications on future trends in trade pattern.

V. MUTUAL TRADE BETWEEN PACIFIC ASIAN COUNTRIES IN 1975

Differences in trade and industrial structure between countries are, as a matter of course, reflected in their patterns of mutual trade. Since the ASEAN I-O Table has the advantage of supplying this information, we will, first, observe the entire framework of trade in the region and, second, examine how textile industries in Korea and Thailand are related to other countries through trade.

The ASEAN I-O Table shows the connection of industries in the region as suppliers of input or purchasers of output. Table IV depicts the main suppliers of input materials for each country's agriculture and manufacturing. Also, domestic-input ratio, intermediate-input ratio, and non-traded-goods ratio are given below the table. These ratios show a 90 per cent self-sufficiency for agriculture input in most countries and 70 per cent for manufacturing in the ASEAN countries, except for a lower rate in Singapore. The dominant suppliers of imported inputs in ASEAN agriculture and manufacturing are, as expected, Japan and the United States. Though figures are low, it is interesting that Korea supplied intermediate goods to most ASEAN manufacturing industries. Singapore also exported considerable amounts of manufactured input to neighboring Malaysia and Indonesia. The Philippines seems to depend to a larger extent on imported materials from the rest of the world. Thailand exported a small, but significant amount, of manufactured goods to Malaysia and Singapore.

In summary, the observations show that Japan and the United States are important to the ASEAN countries as suppliers of input. Korea seems to be forming similar economic relations with ASEAN. In ASEAN, the international division of labor is intensive between Singapore, Malaysia, and Indonesia. Thai relations with other ASEAN countries were slightly weak. The Philippines is economically rather independent of the other ASEAN countries.

Using Figure 4 compiled from the ASEAN I-O Table, we will now show an example of unique micro study. In relation to the analysis in Section III, we will compare the Korean textile industry, a major exporter to the world, and the Thai industry, a major exporter among ASEAN countries. The chart includes five subsectors (spinning, weaving, knitting, wearing apparel, and other made-up textile goods) of the textile industry group. It shows the level of production and the transactions between the subsectors. It also shows the main input-supplying country and the main output-consuming country. The width of the lines roughly represents the value of transactions.

The two flow charts very clearly indicate the differences in industrial development stage. First, Korean production is 2.4 times Thai production in downstream industry (wearing apparel), but 3.8 times in upstream industry (spinning). This means that the textile-industry complex in Korea is more developed than in Thailand, especially in its upstream industry. Second, as a result of the first factor, the Thai dependency ratio on imported input is much higher than the Korean especially in the spinning industry. The domestic supply of raw

TABLE IV

INTERDEPENDENCE THROUGH INPUT STRUCTURE (Agriculture, Manufacturing)

From \ To		Indonesia A	Indonesia M	Malaysia A	Malaysia M	Philippines A	Philippines M	Singapore A	Singapore M	Thailand A	Thailand M	Japan A	Japan M	Korea A	Korea M	U.S.A. A	U.S.A. M
Indonesia	A							×	×						×		
	Q						×		◎				×			×	
	M							×	○								
Malaysia	A							×	×								
	Q																
	M							○	○						×		
Philippines	A																
	Q																
	M												×				
Singapore	A																
	Q										×						
	M	△	×	○	△												
Thailand	A			×	×			×	×						×		
	Q																
	M				×			×	×								
Japan	A																
	Q																
	M	△	◎	○	○	×	○	○	◎	△	◎			○	◎	×	×
Korea	A											×					
	Q																
	M		×		×			×	×		×		×				
U.S.A.	A				×		×		×		×	×	×		○		
	Q												×		×		
	M	△	×	○	△	△	△	○	○	×	×	×	×	△	○		
Rest of the world	A		△	×	△			△	△		△		△			△	×
	Q				◎		◎		◎		◎		◎		◎		
	M	○	○	◎	◎	◎	○	◎	◎	○	○	△	△	○	○	○	○
Domestic-input ratio (%)		90	81	78	74	90	74	72	38	92	78	96	86	90	71	93	93
Intermediate-input ratio (%)		9	70	19	66	19	73	65	75	23	67	41	71	24	77	70	63
Non-traded-goods ratio (%)		37	14	22	13	29	20	23	16	30	16	26	23	19	15	30	22

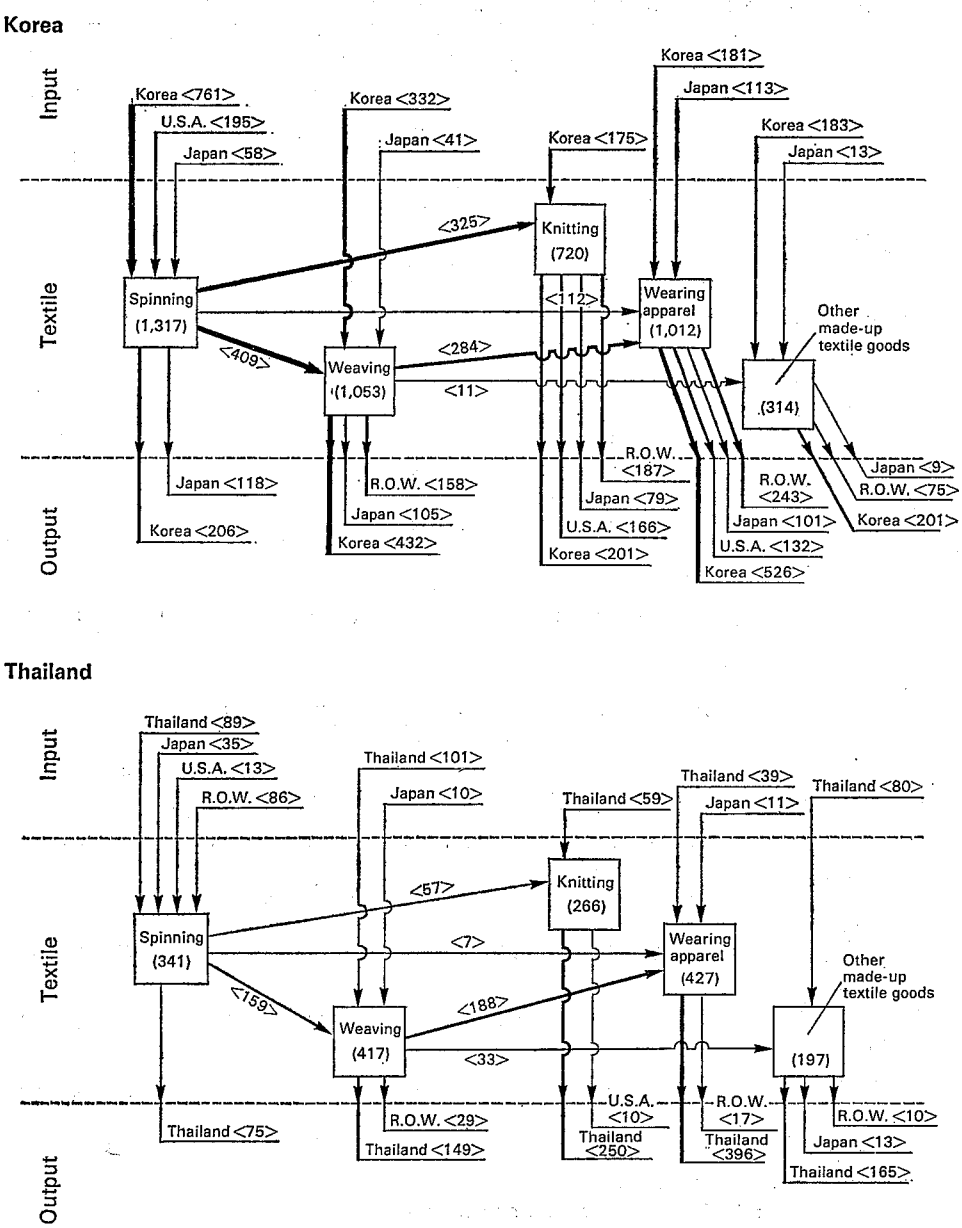
Source: [5].

Notes: 1. Sector name:

A : Agriculture, forestry, and fishery
Q : Mining and quarrying
M : Manufacturing
◎ : More than 5% of total intermediate inputs
○ : More than 2% of total intermediate inputs
△ : More than 1% of total intermediate inputs
× : More than 0.1% of total intermediate inputs

2. Domestic-input ratio and non-traded-goods ratio are defined to the total intermediate inputs.

Fig. 4. Commodity Flow in the Textile Industry, 1975



Source: [5].

Notes: 1. ( )=output in U.S.$ million; < >=transaction in U.S.$ million.
2. R.O.W.=rest of the world.

materials for spinning is 58 per cent of the value of output in Korea and 26 per cent in Thailand. But, in wearing apparel, the figures are almost same, 57 per cent for Korea and 59 per cent for Thailand. Third, output is mostly consumed in the Thai domestic market, while a considerable amount is exported by Korea. In Korea, the weaving apparel industry supplies 52 per cent to the domestic market, the wearing industry 69 per cent, and the spinning industry 80 per cent. The corresponding figures in Thailand are 92 per cent, 88 per cent, and 90 per cent. Korea's strong international competitiveness is also supported by being able to export a large amount of all textile goods to Japan. Thus, we conclude that Korea has completely entered the export stage in all textile industries, but Thailand has entered the export stage only in the downstream industries.

CONCLUSION

Although very loosely, this empirical study clarifies the linkage between economic development, industrial structure, and trade pattern. In short, when an economy develops, the weight of industrial structure in a country shifts from unskilled-labor-intensive sectors to industries that are capital-, skill-, and/or technology-intensive. Moreover, if we confine the analysis to developing countries, including the NICs, an industry's share shrinks as the industry becomes more capital-, skill-, and/or technology-intensive. Also, the relative share of unskilled-labor-intensive industry is smaller in countries with a higher per capita income. Thus, if an industry develops earlier and consequently has a relatively higher share in manufacturing than other industries, the industry has greater export opportunity. If an industry is newly developed and has a lower share, it may still be at the import substitution stage. The situations in various industries is the determinant of country's trade pattern.

The analysis in this paper has been devoted to a cross-sectional comparison between countries in 1975. But, if the difference in degree of economic development between countries is regarded as a difference in time series for one country, we may be able to forecast the country's future trade pattern. Of course, as we have already seen, there may be reservations in making such a forecast. The fundamental economic characteristics of Malaysia and Singapore are different from the other countries. However, it should not be too far off the target if we say that Indonesia, Philippines, and Thailand will follow the same basic path as Korea.

Still, much study remains to be done. Our analysis of six industries may not suffice as a generalization for empirical findings. An extension of industrial coverage is one path that might be pursued. Time-series analysis of one country in a similar analytical framework would be another important subject for research.

REFERENCES

1. AKAMATSU, K. "A Historical Pattern of Economic Growth in Developing Countries," *Developing Economies,* Preliminary Issue, No. 1 (March–August 1962).

2. Asian Development Bank, Economic Office. *Key Economic Indicators of Developing Member Countries of ADB*, Vol. 12, No. 1 (Manila: Asian Development Bank, 1981).
3. BALASSA, B. "Trade Liberalisation and 'Revealed' Comparative Advantage," *Manchester School of Economics and Social Studies*, Vol. 33, No. 2 (May 1965).
4. CLARK, C. *The Conditions of Economic Progress* (New York: St Martin's Press, 1951).
5. Institute of Developing Economies. *International Input-Output Table for ASEAN Countries, 1975*, Statistical Data Series No. 39 (Tokyo, 1982).
6. KUZNETS, S. *Modern Economic Growth: Rate, Structure, and Spread* (New Haven, Conn.: Yale University Press, 1966).
7. VERNON, R. "International Investment and International Trade in the Product Cycle," *Quartery Journal of Economics*, Vol. 80, No. 2 (May 1966).