PART I

COMPILATION OF THE INTERNATIONAL INPUT-OUTPUT TABLE THAILAND-JAPAN, 1985

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CHAPTER 1. GENERAL OUTLINE

1.1 Background

This project was initiated for the purpose of providing the public with comprehensive statistical data on the inter-industrial relationship between Thailand and Japan. Especially, as the 1975 Thailand-Japan International Input-Output Table[1] has already been published, the 1985 table can be expected to contribute to studies on the structural changes in the economic relationship between the two countries which have occurred between these years.

The bilateral input-output table is designed so that it can systematically depict how the two countries are dependent on each other at the industrial level. For instance, we can see at a glance, from the bilateral input-output table, how each domestic industry used intermediate goods supplied by specific industries from the partner country as well as those supplied by the domestic industries. Furthermore, by assuming the stability (or linearity) of the technical relationship between the input (imported as well as domestic) and the output figures, the table can serve as an effective analytical tool for the study of the economic repercussion effect between the two countries. For instance, we can estimate how an increase in demand for a certain commodity ultimately affects production in specific industries in the partner country and also its balance of payments.

[1] CUSRI and IDE, *International Input-Output Table, Thailand-Japan, 1975*, IDE Statistical Data Series, NO.35 (Tokyo : IDE, 1981)

1.2 Format of the Table

The 1985 Thailand-Japan International Input-Output Table is a commodity table in which all of the economic transactions undertaken, in 1985, in and between the territories of Thailand and Japan are expressed in a manner similar to a domestic input-output table. Table1 illustrates the format of the 1985 table. The format of the 1985 table is, for the most part, similar to that of the 1975 table. However, the major differences between the two tables are : (1)In the 1975 table, the custom duties and commodity taxes are separated into two rows - one for imports from the partner country and one for imports from the Rest of the World (ROW) - but, in the 1985 table, they are unified into one row for custom duties and commodity taxes on the total imports : (2)The number of countries or regions covered in the export matrix is increased from seven in the 1975 table to ten in the 1985 table.

In Table1, the first column shows the input structure of industries in Japan. A^{JJ} (155 x 155) depicts the flow of goods and services produced and used by the Japanese industries(at producers' value). A^{TJ} (155 x 155) gives the flow of goods produced by the Thai industries but used by the Japanese industries, i. e., the import matrix from Thailand(also at producers' value). The row below, B^{J} (1 x 155), is for the freight and insurance on imported goods from Thailand. A^{WJ} (155 x 155) is the import matrix from the Rest of the World. Therefore, A^{WJ} is, in appearance, similar to A^{TJ}, but it is valued at c. i. f. and the imports of services from Thailand are also contained in A^{WJ}. In A^{TJ}, only the domestic trade margin and transportation costs on the imported goods from Thailand are presented, expressed as imports of services from Thailand. D^{J} (1 x 155) represents the custom duties and commodity taxes on the total imports to Japan. And V^{J} (4 x 155) and X^{J} (1 x 155) are, respectively, value added and total inputs.

The second column shows the input structures of industries in Thailand. A^{JT} (155 x 155) is the import matrix from Japan. A^{TT} (155 x 155) is the intermediate transaction matrix of Thai domestic goods and services. The explanations for the first column also apply to the other parts of the second column (B^{T}, A^{WT}, D^{T}, V^{T}, and X^{T}). The third and the fourth columns show the flow of goods and services produced for final demand in Japan and in Thailand. F^{JJ} (155 x 4) is the final demand for Japanese domestic goods and services and F^{TJ} (155 x 4) that for imported goods from Thailand. In contrast, F^{JT} (155 x 4)

Table 1 Format of the 1985 Thailand–Japan International Input–Output Table

To / From	AJ001–AJ155 AJ900	AT001–AT155 AT900	ET 900	FJ001–FJ004 FJ900	FT001–FT004 FT900	FX 900	GJ 900	GT 900	LC001–LW001 LX900	QX 001	XX 600
AJ001 | AJ155 AJ900	A^{JJ}	A^{JT}		F^{JJ}	F^{JT}				L^{J}	Q^{J}	X^{J}
AT001 | AT155 AT900	A^{TJ}	A^{TT}		F^{TJ}	F^{TT}				L^{T}	Q^{T}	X^{T}
BF001	B^{J}	B^{T}		B^{J}	B^{T}						
CW001 | CW155 CW900	A^{WJ}	A^{WT}		F^{WJ}	F^{WT}						
DT001	D^{J}	D^{T}		D^{J}	D^{T}						
ET900											
VV001 | VV004 VV900	V^{J}	V^{T}									
XX600	X^{J}	X^{T}									

Note: Blanks in the table are sub-totals. (See Appendix1.1.)

is the final demand for imported goods from Japan and F^{TT} that for Thai domestic goods and services. The same explanation for the first and the second columns can be applied to the other parts of the third and the fourth columns (B^{J}, F^{WJ}, D^{J}, B^{T}, F^{WT}, and D^{T}).

L^{J} (155 x 10) and L^{T} (155 x 10) are the export matrices for Japan and Thailand to ten countries or regions – China, Hong Kong, Indonesia, Korea, Malaysia, Taiwan, Philippines, Singapore, U.S.A., and the Rest of the World. Q^{J} (155 x 1) and Q^{T} (155 x 1) are the statistical discrepancies which will be discussed again on page 17. Finally, X^{J} (155 x 1) and X^{T} (155 x 1) are the total output figures for Japan and Thailand.

1.3 Compilation Steps

The project was initiated in 1987 and completed in 1991. During this period, the 1985 Thailand–Japan International Input–Output Table was compiled and included the following steps.

Note : Each code inside the parenthesis after each title indicates the corresponding step in the Flow Chart.

(1) Compilation of the 1985 Thailand Input–Output Table by Updating (1–B)

Since the 1985 Thailand input–output table was not available at the beginning of the project, the 1985 Thailand input–output table was compiled by updating the 1982 Thailand input–output table[1]. Input coefficients obtained from the special survey on input structures of the 1985 Thailand input–output table were also used for updating, which was done mostly by the manual adjustment method.

(2) Construction of the Uniform Input–Output Sector Classification (1–A, 2–A)

The Uniform Input–Output Sector Classification (UIO) was prepared for converting the domestic input–output tables into one bilateral input–output table. Also, several converters which link the input–output tables and the trade statistics were prepared here.

(3) Conducting the Special Survey (1-C , 2-C)

A special survey[2] was conducted by CUSRI to investigate the shares of imported goods, by country of origin, which were used in producing goods in Thailand. On the other hand, the Ministry of International Trade and Industry (MITI), Japan, conducted a survey to investigate the distribution ratios, by input sector, of the imported goods in Japan.

(4) Compilation of the Import Matrices (1-C , 2-C)

The import matrices by country of origin were compiled to link the domestic input-output tables. In this step, the results of the special survey mentioned above were used. The method of compilation here will be discussed again on page 16.

(5) Consistency Check of the Converter System (1-A , 2-A)

The trade statistics between the two countries - Japanese exports with Thai imports and Thai exports with Japanese imports - were compared, in US dollars, at the UIO level to check the consistency of the UIO-TIO(JIO)-CCCN converters.

(6) An Estimation of Freight and Insurance (1-C , 2-C)

Freight and insurance ratios to the imports from the partner country were estimated. These ratios were used in converting the import matrix from the partner county (originally valued at c. i. f.) into f. o. b. values.

(7) Conceptual Adjustments of the Domestic Input-Output Tables (1-B , 2-B)

The concept and format of the domestic input-output tables were adjusted so that the Thai and Japanese tables match each other. The details of the adjustment method employed will be discussed on page15.

(8) Linkage of Data (3)

The final compilation step was to link all the data compiled through steps (1)-(7) - transaction matrices of domestic goods, import matrices, etc. - into one bilateral input-output table. At the same time, the valuation of the domestic input-out tables (=local currencies) were converted into US dollars. After the linkage, some adjustments were made to balance the bilateral table.

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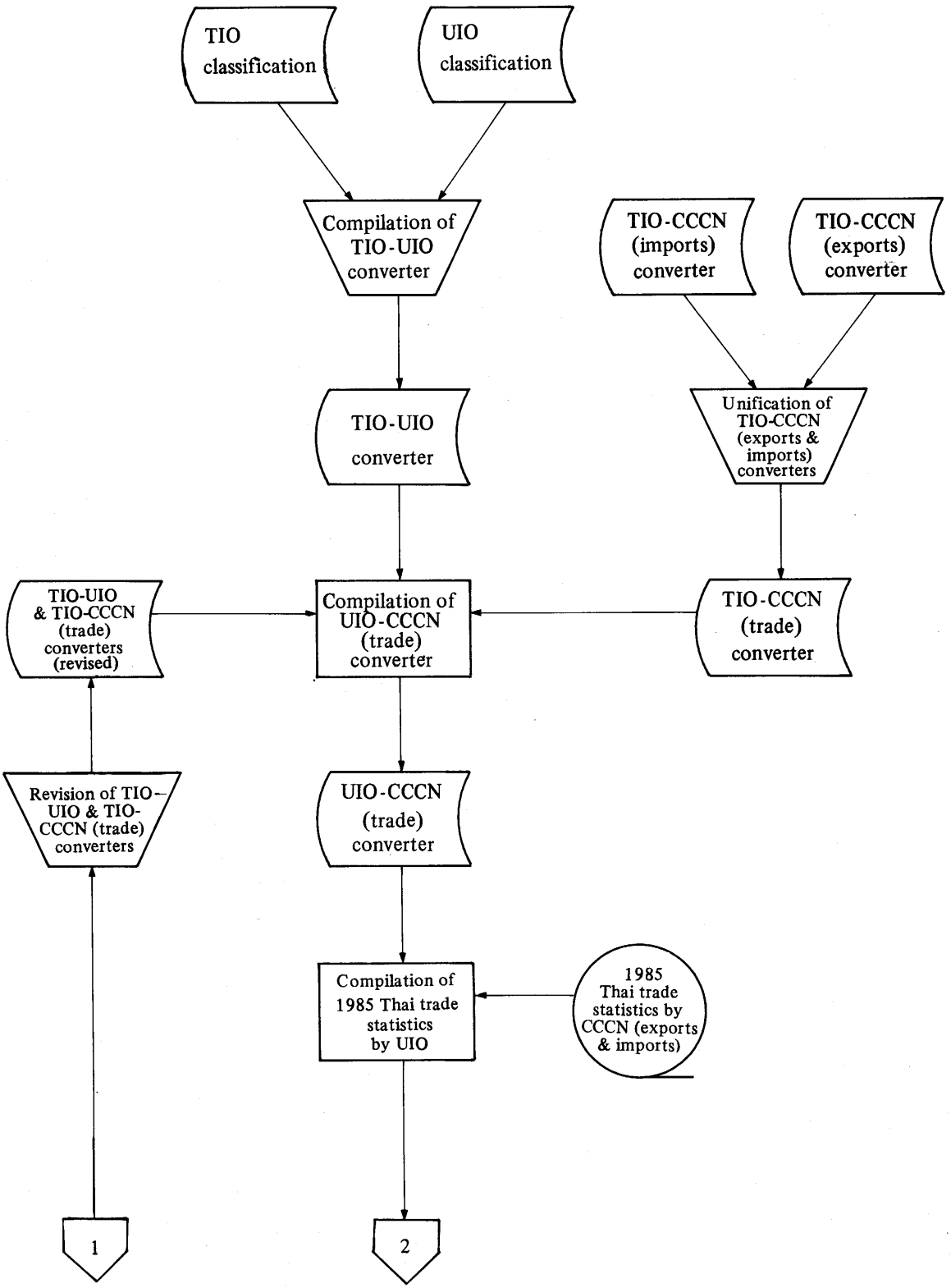
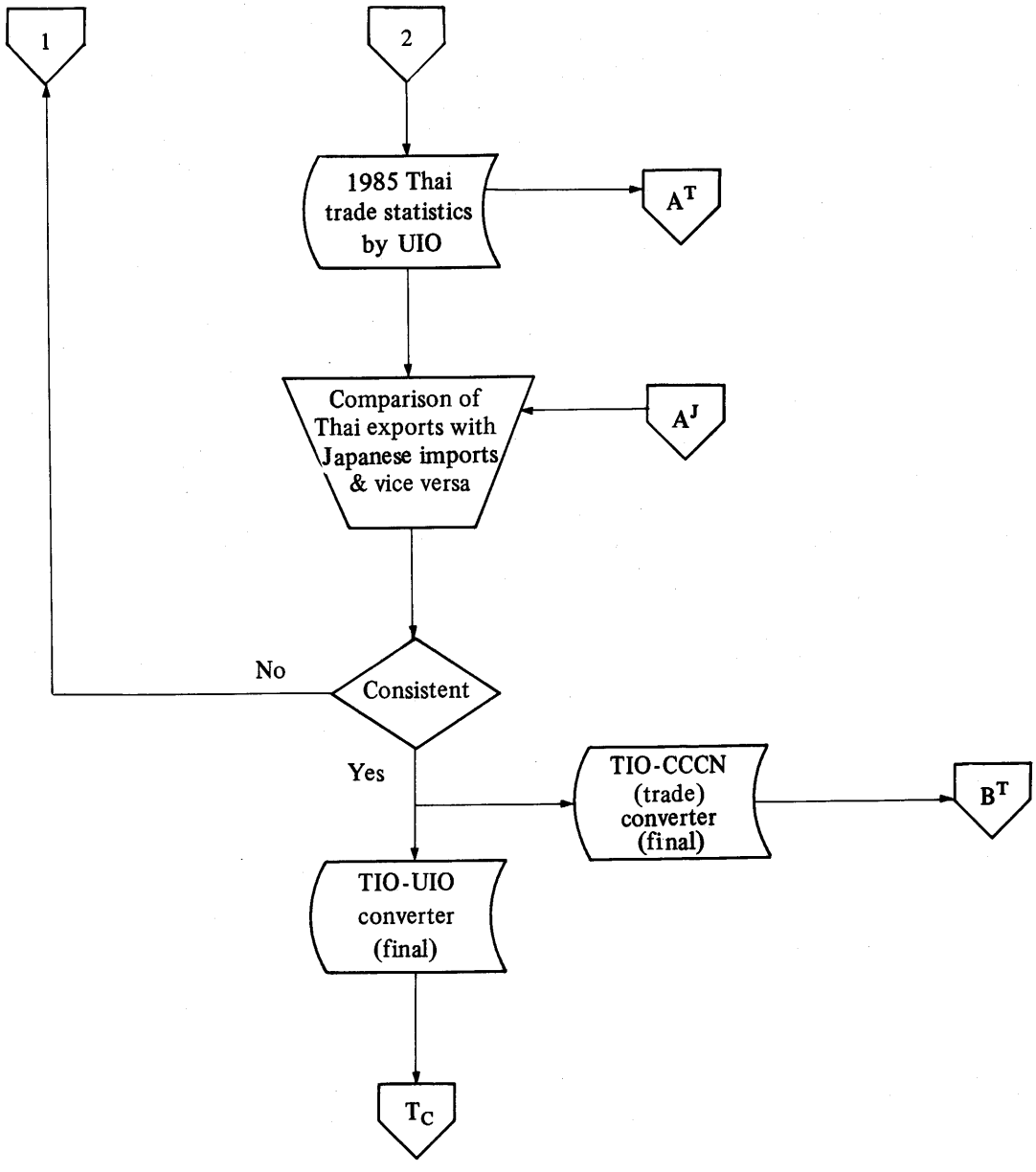
[1]CUSRI and IDE, *Input-Output Table of Thailand, 1982*, IDE Statistical Data Series NO.53 (Tokyo : IDE, 1989)
[2]CUSRI and IDE, *Report for Special Survey on Imported Component of Input in Thailand*, Asian Input-Output Series NO. 5 (Tokyo : IDE, 1988)

Flow Chart

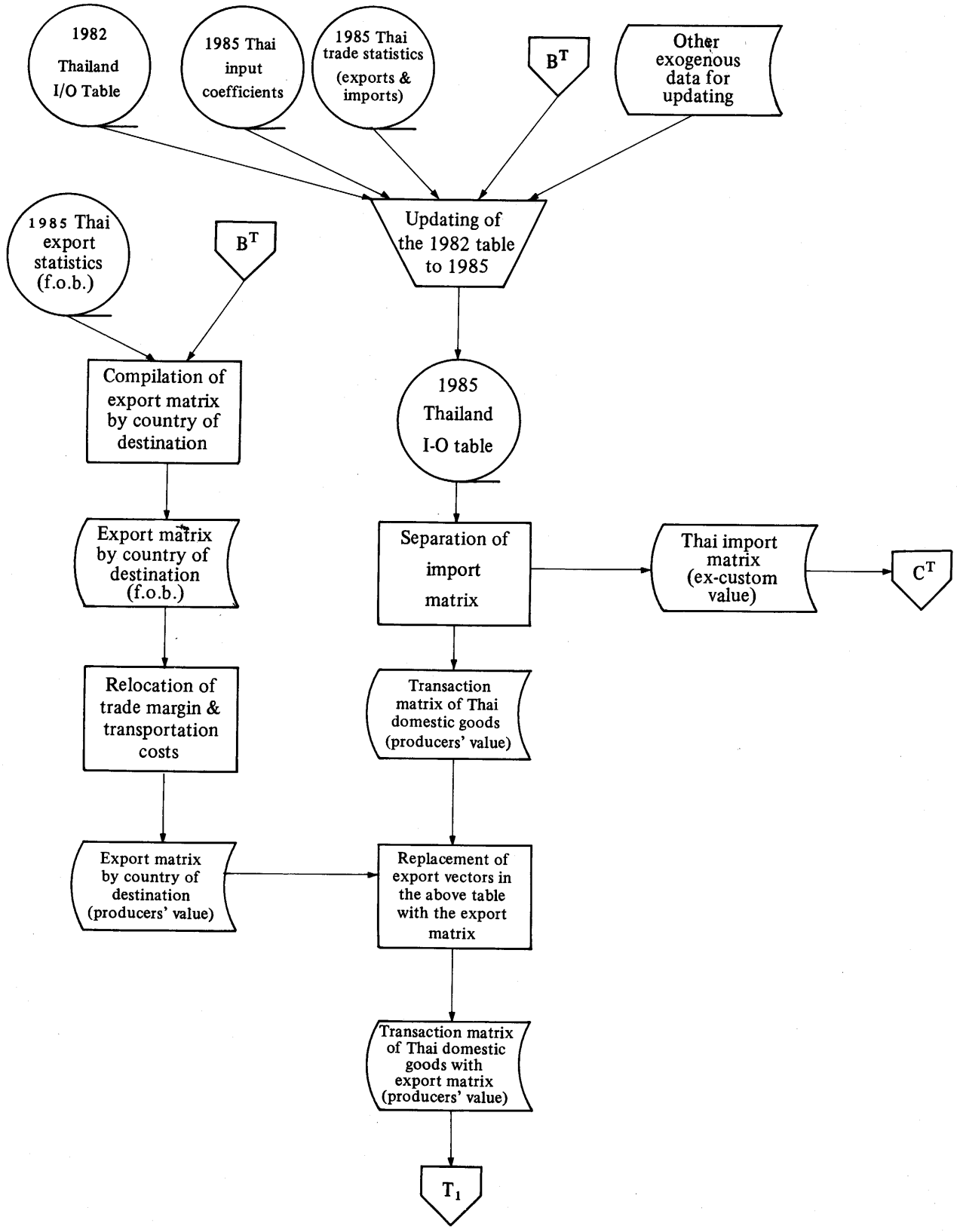
1. **Work on Thai Data**

1-A Construction of Thai Converter System

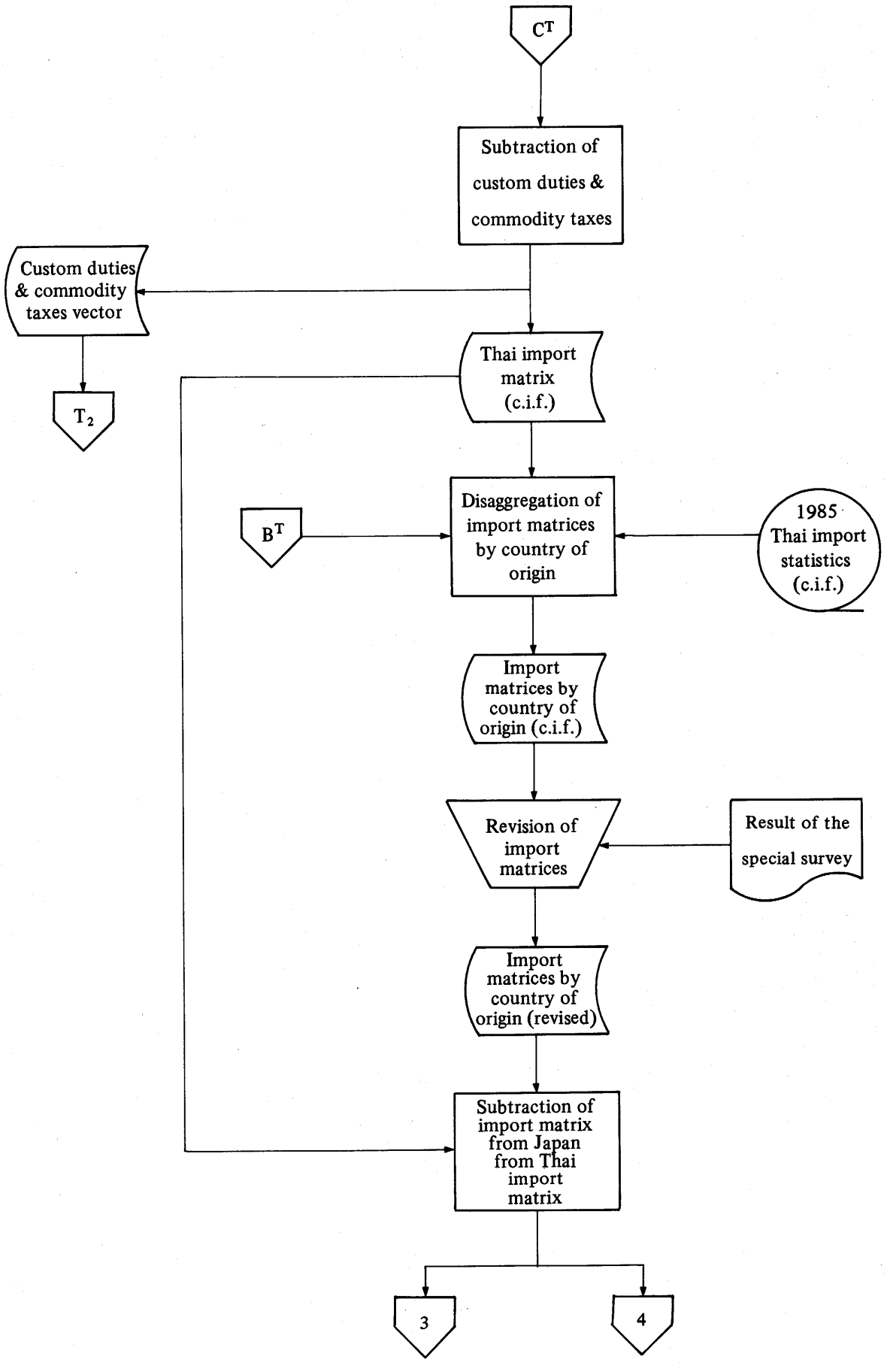


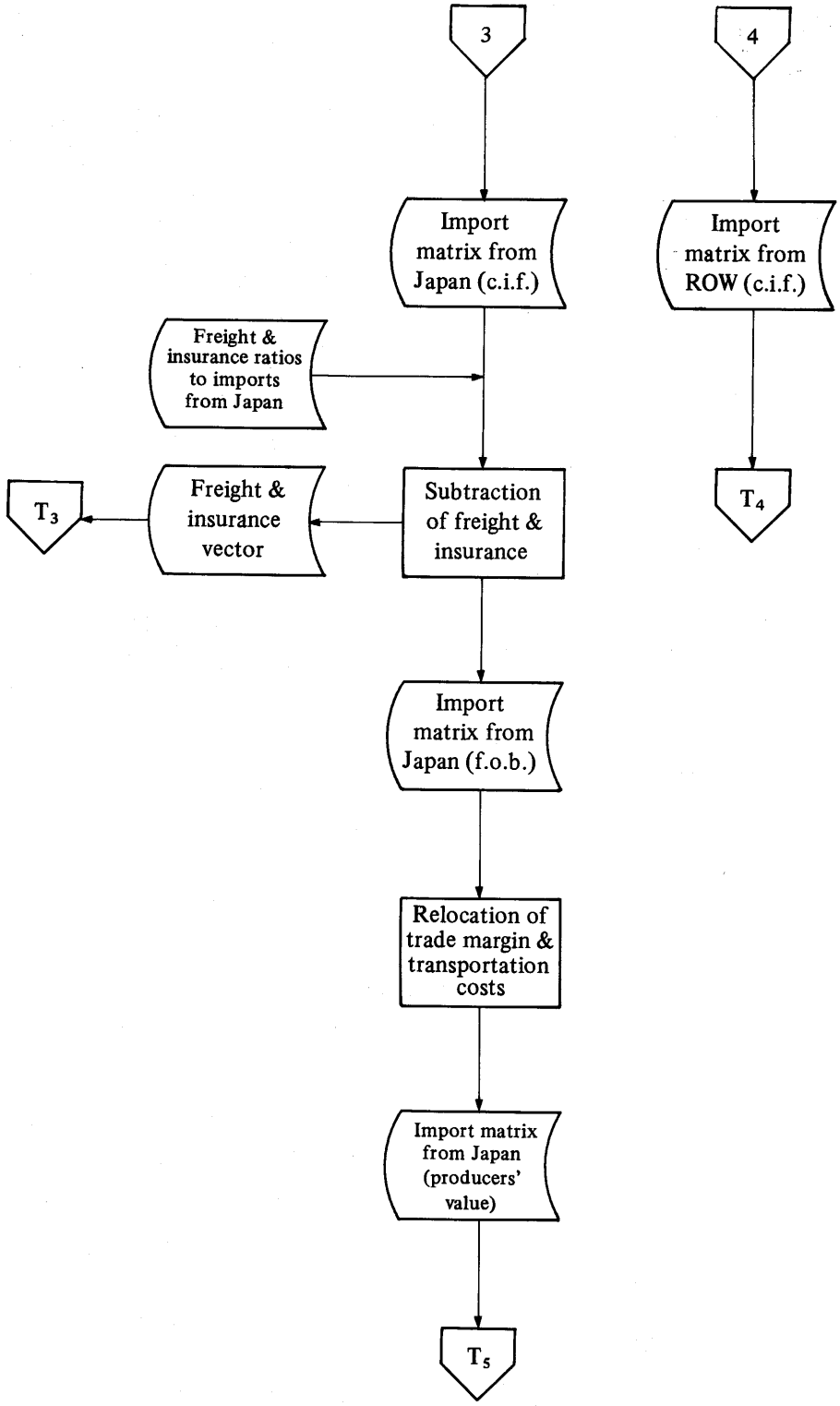

1
2
1985 Thai trade statistics by UIO
A^T
Comparison of Thai exports with Japanese imports & vice versa
A^J
No
Consistent
Yes
TIO-CCCN (trade) converter (final)
B^T
TIO-UIO converter (final)
T_C

1-B Work on Thai Input-Output Table



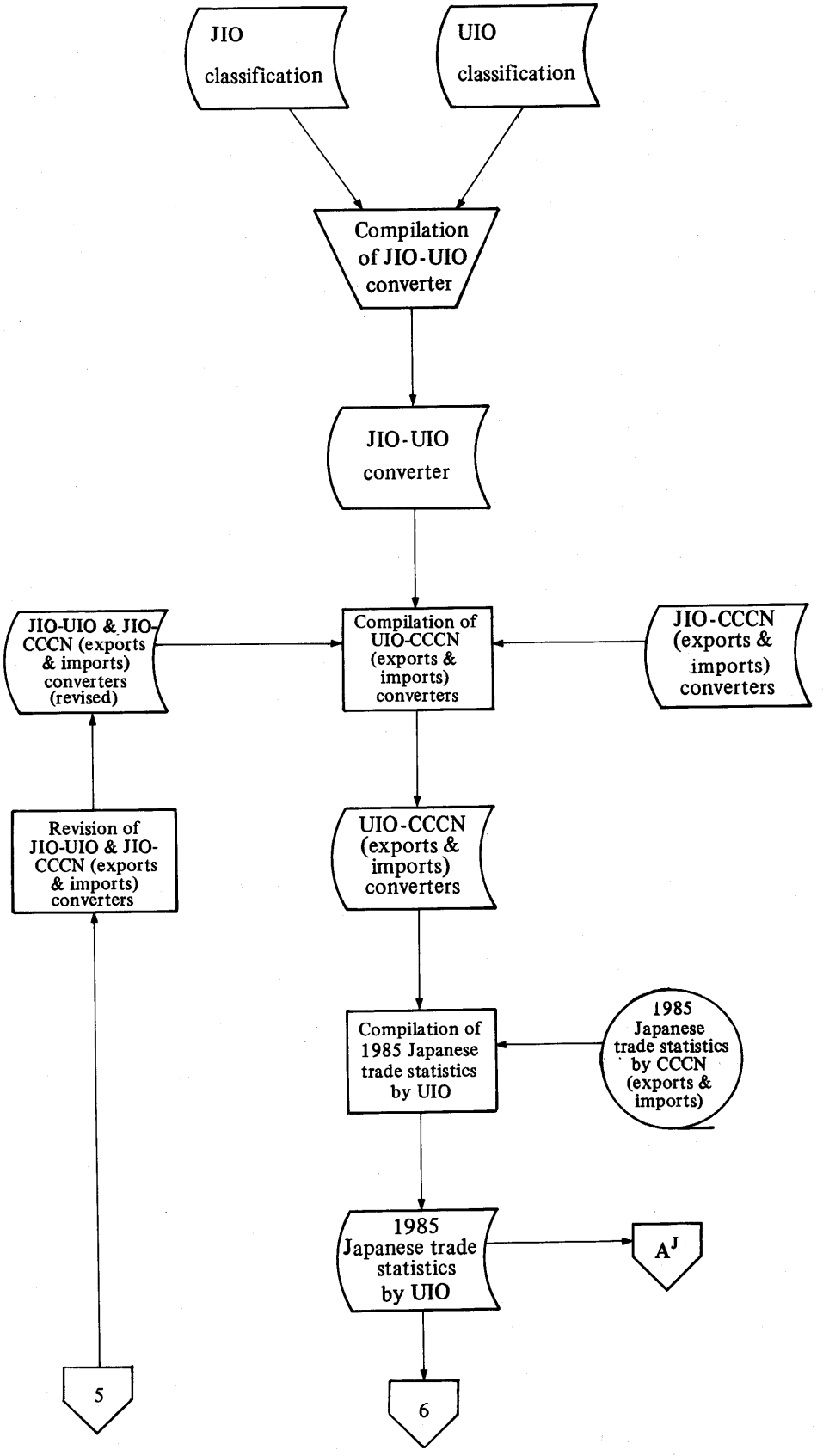
1-C Compilation of Thai Import Matrix

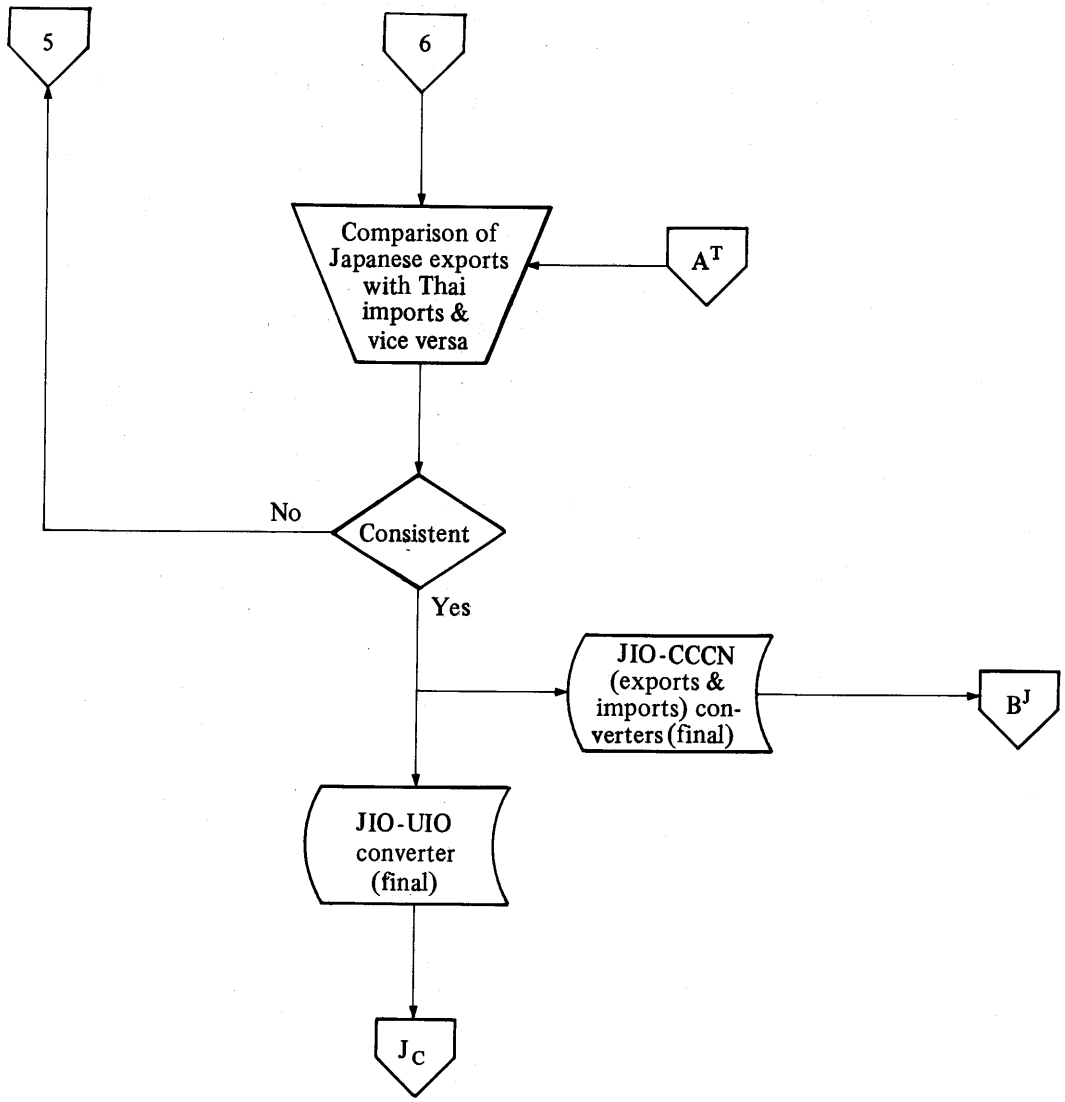



3
4
Import matrix from Japan (c.i.f.)
Import matrix from ROW (c.i.f.)
Freight & insurance ratios to imports from Japan
T3
Freight & insurance vector
Subtraction of freight & insurance
T4
Import matrix from Japan (f.o.b.)
Relocation of trade margin & transportation costs
Import matrix from Japan (producers' value)
T5

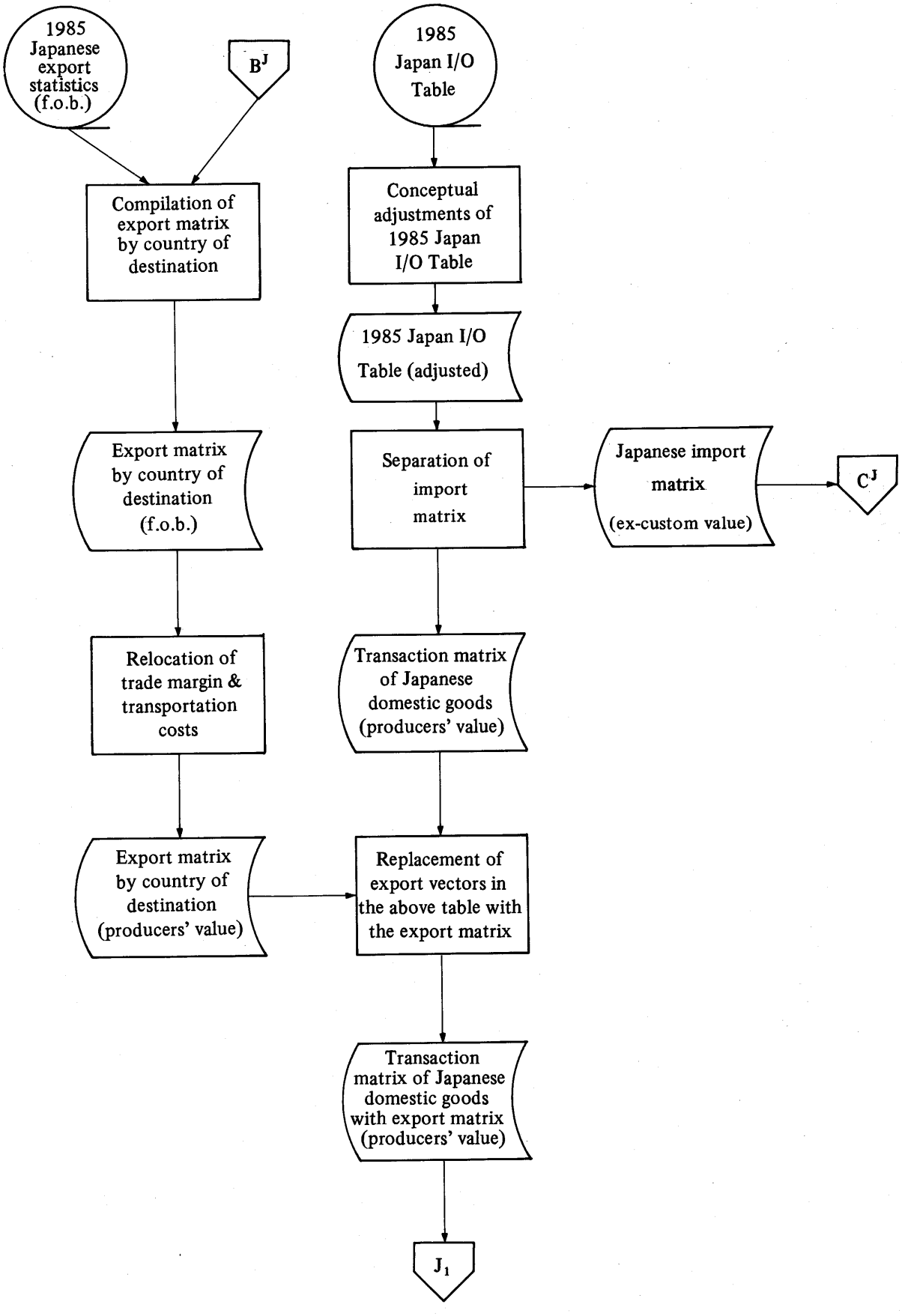
2. **Work on Japanese Data**

2-A Construction of Japanese Converter System

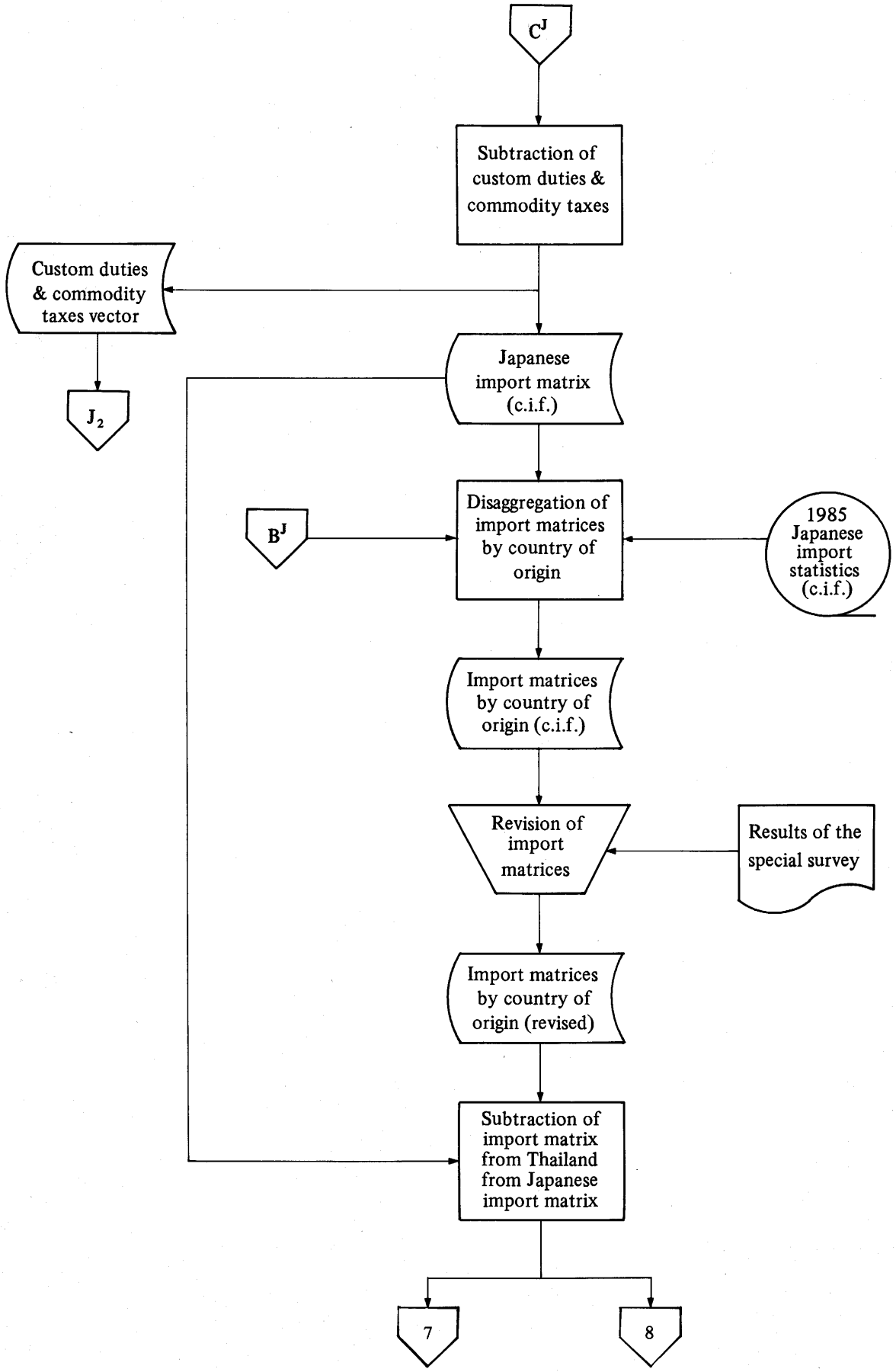


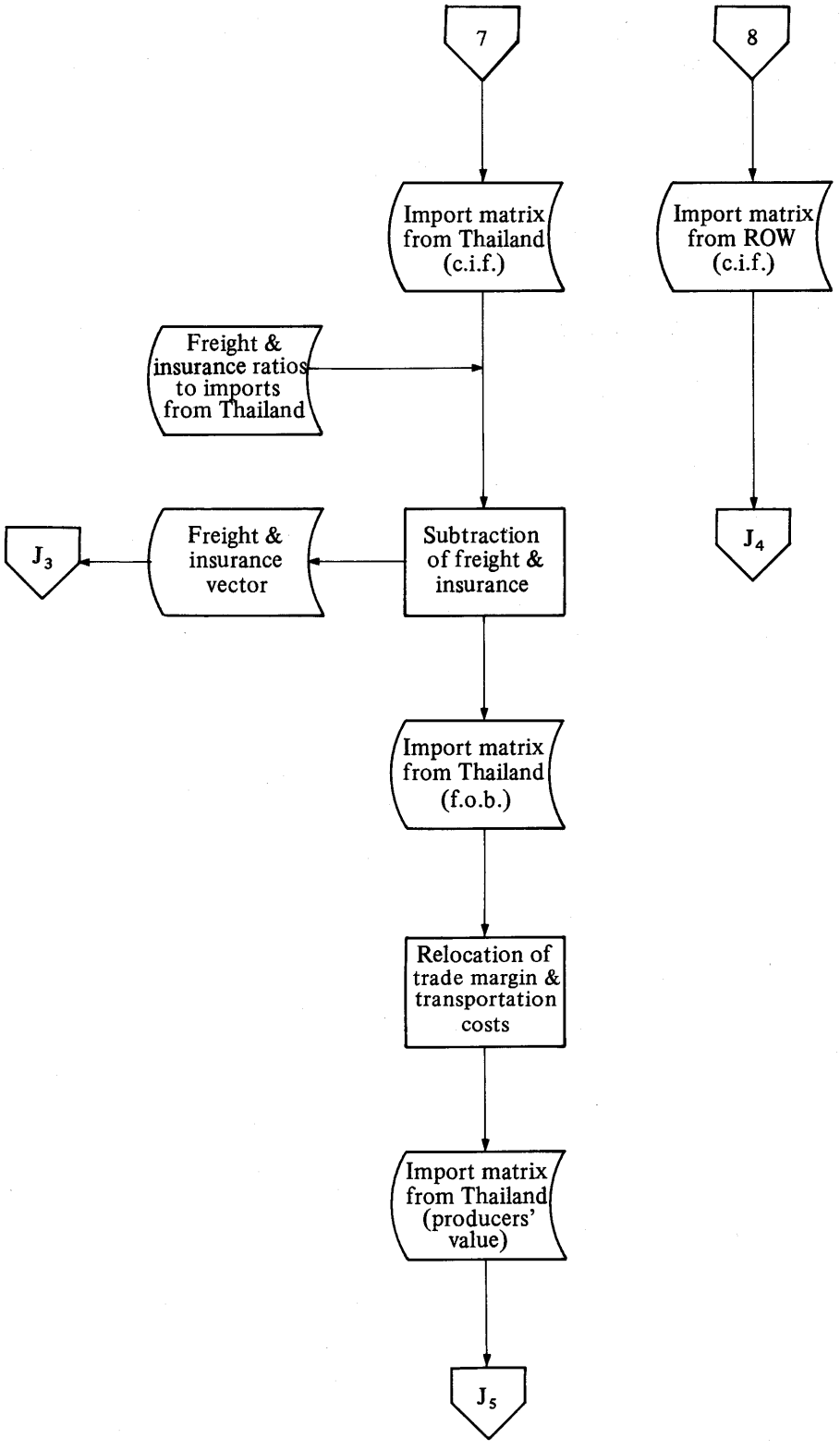

5
6
Comparison of Japanese exports with Thai imports & vice versa
A^T
No
Consistent
Yes
JIO-CCCN (exports & imports) converters (final)
B^J
JIO-UIO converter (final)
J_C

2-B Work on Japanese Input-Output Table

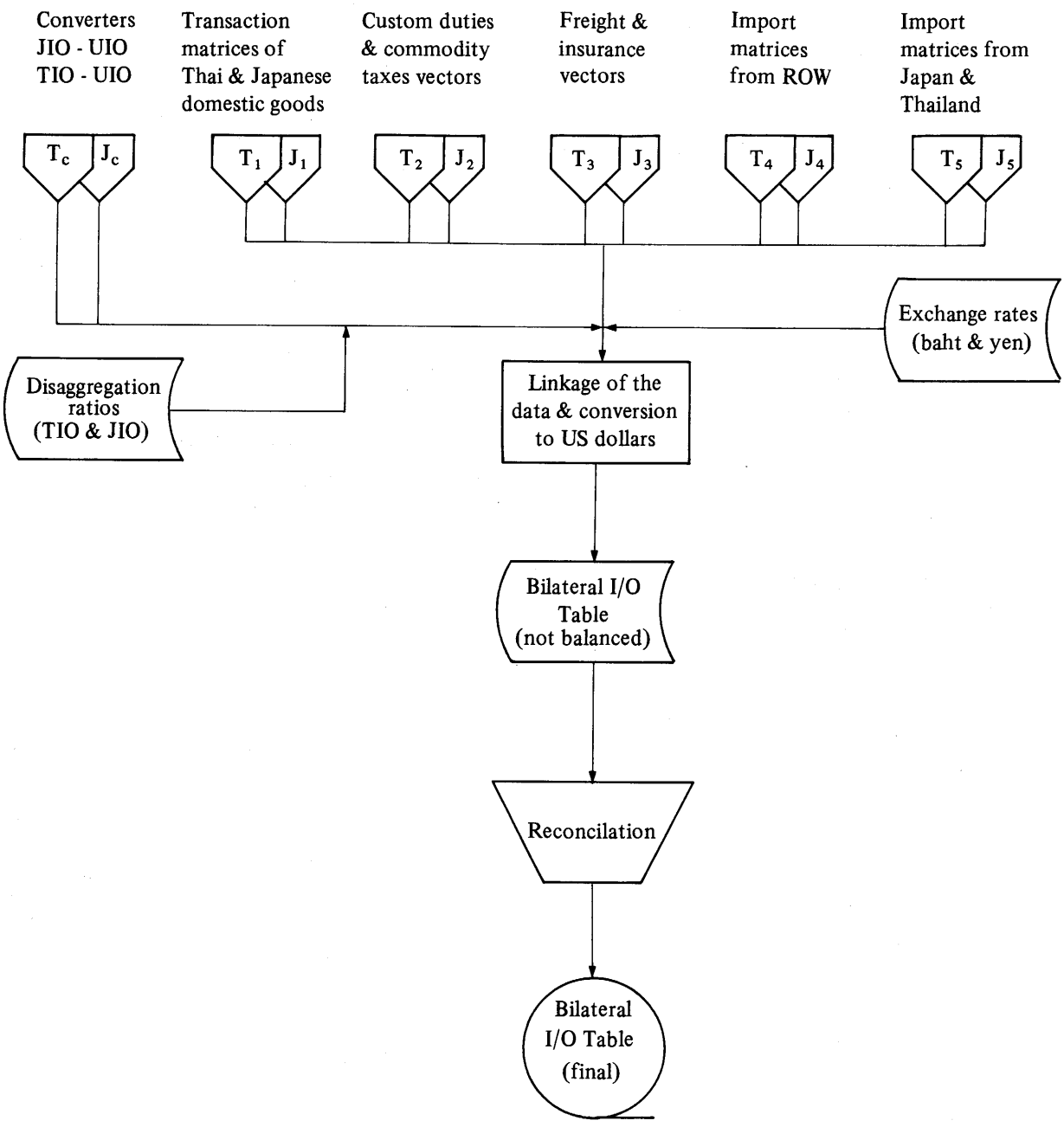


2-C Compilation of Japanese Import Matrix




7
8
Import matrix from Thailand (c.i.f.)
Import matrix from ROW (c.i.f.)
Freight & insurance ratios to imports from Thailand
J3
Freight & insurance vector
Subtraction of freight & insurance
J4
Import matrix from Thailand (f.o.b.)
Relocation of trade margin & transportation costs
Import matrix from Thailand (producers' value)
J5

3. **Linkage of the data**



Note : The data linked in the process shown above compose the bilateral I/O table in Table 1 as follows.

$T_1 = A^{TT} + F^{TT} + L^T + V^T + X^T$
$J_1 = A^{JJ} + F^{JJ} + L^J + V^J + X^J$
$T_2 = D^T$
$J_2 = D^J$
$T_3 = B^T$
$J_3 = B^J$
$T_4 = A^{WT} + F^{WT}$
$J_4 = A^{WJ} + F^{WJ}$
$T_5 = A^{JT} + F^{JT}$
$J_5 = A^{TJ} + F^{TJ}$

CHAPTER 2. METHODOLOGY

2.1 Sector Classification and Converter System

The 1985 Thailand-Japan International Input-Output Table was compiled by linking the 1985 input-output tables for Thailand and Japan through the Uniform Input-Output Sector Classification (UIO). The UIO is composed of 155 sectors, each of which corresponds to both the Thai and the Japanese input-output sectors either directly or through disaggregation of sectors : the Thai and the Japanese domestic input-output tables have 230 row and column sectors and 529 row and 408 column sectors, respectively.

In addition to the basic table, two aggregated tables are also provided, 7 and 69 sectors, and each corresponds to the publication of the 1975 Thailand-Japan International Input-Output Table. For the convenience of those who would like to see the structural changes between 1975 and 1985, the converter between the 1975 UIO (166 sectors) and the 1985 UIO is included in the appendix (see Appendix2.3).

The converters developed for the project are as follows ;

(1) UIO-Input-Output Sector Classification of Thailand
(2) UIO-Input-Output Sector Classification of Japan
(3) UIO-Trade Classification of Thailand (CCCN)
(4) UIO-Export Classification of Japan (CCCN)
(5) UIO-Import Classification of Japan (CCCN)
(6) UIO-Aggregated UIO (7 and 69 sectors)
(7) UIO-1975 UIO (166 sectors)

2.2 Valuation in Common Currency

The 1985 Thailand-Japan International Input-Output Table is valued at a common currency of US dollars. The exchange rates actually applied were 27.159 baht/US dollar and 238.54 yen/US dollar, which were calculated by averaging the monthly 1985 exchange rates (derived from *International Financial Statistics, Jan., 1989,* International Monetary Fund).

2.3 Conceptual Adjustments of the Japanese Input-Output Table

Since the Thai and the Japanese input-output tables do not necessarily match each other in regard to format and concept, it was necessary to make adjustments to either one. For this purpose, both the concept and format of the Japanese table were adjusted in the following ways.

(1) Business Consumption

Business consumption has its own sector in the Japanese input-output table, whereas it is not separated from the others in the Thai table. Therefore, the column and row for business consumption in the Japanese table were removed by distributing them proportionally (based on the compositions of the row and the column) to each element of the matrix.

(2) Repair of General Machinery and Electric Machinery

In the Japanese table, repairs are separated from production in the sectors grouped as general machinery and electric machinery and have their own sectors, Repair of General Machinery and Repair of Electric Machinery. Therefore, these two sectors were removed by distributing them to those elements which are considered to be closely related to the use of the respective machinery.

(3) Bank Service Charges

In the Japanese table, bank service charges are distributed to the intermediate transactions only, whereas they are not in the Thai table. Therefore, portions of these were distributed to the final demand sectors based on the financial data.

(4) Public Administration

In the Japanese table, portions of government expenditures are expressed as the intermediate input of the public administration sectors, whereas, in the Thai table, they are expressed as the input of government consumption expenditures (final demand). Therefore, the columns (except for value added) for the public administration sectors were removed by merging them into the government consumption expenditures.

(5) Dummy Sectors

In the Japanese table, services produced for own use, such as self-education, are separated from their main activities and have their own dummy sectors. Therefore, these dummy sectors were removed by distributing them proportionally (based on the compositions of the row and the column) to each element of the matrix. Another sector which is provided with a dummy sector in the Japanese table is office supplies, and it was removed in the same way.

(6) Compilation of the Export Matrix

In order to recompose the exports, the column of ordinary exports in the Japanese table was replaced by the export matrix (JIO x country of destination) which was compiled based on the 1985 Japanese export statistics. At the same time, the valuation of the export matrix was converted into producers' value (from f. o. b.) by relocating trade margin and transportation costs. In the export matrix, the columns for special exports and direct purchases (export) were merged into the export to the Rest of the World column.

Note : The work applied to (6) was also done on the Thai table.

2.4 Compilation of the Import Matrices

Four kinds of the import matrices, which cover both intermediate transactions and final demand, were compiled in order to link the domestic input-output tables, namely ; (i) Thailand x Japan, (ii) ROW x Japan, (iii) Japan x Thailand, and (iv) ROW x Thailand. The compilation methods are discussed below, with an example of the import matrices for Thailand.

(1) Compilation of the Import Matrices based on the Import Statistics

First, the valuation of the original import matrix of the Thai domestic input-output table (=ex-custom value) was changed into c. i. f. by subtracting custom duties and commodity taxes. Then, import matrices by country of origin were compiled by disaggregating the original import matrix into eleven countries or regions - Japan, China, Hong Kong, Indonesia, Korea, Malaysia, Taiwan, Philippines, Singapore , U.S.A., and ROW - on the basis of the 1985 Thai import statistics.

The formula applied here was ;

$$M_{ij}^{\alpha} = M_{ij} \times (M_i^{\alpha} / M_i)$$

where : M_{ij}^{α} =Thai import matrix from country α
M_{ij} =Thai import matrix (original)
M_i^{α} =imports of commodity i from country α
M_i =Total imports of commodity i ($=\sum_{\alpha} M_i^{\alpha}$)
(both M_i^{α} and M_i were obtained from the import statistics)

In other words, it was assumed that all of the goods imported to Thailand were distributed to each sector in the same poportion ($=M_i^{\alpha}/M_i$) regardless of the input sector in Thailand. As for the valuation, these matrices are valued at c. i. f. because they were obtained from the import

statistics (also valued at c. i. f.).

(2) Revision of the Import Matrices Based on the Results of the Special Survey

Since the import matrices obtained above do not contain any surveyed data, the results of special survey were used to increase the reliability of the table. The special survey conducted by CUSRI provided information on the proportions for the use of the imported goods from a specific country ($=M_{ij}^{\alpha} / M_{ij}$) for each input sector ; on the other hand, the survey conducted by MITI gives information on the proportion by which imported goods from each country were distributed to a specific input sector ($=M_{i}^{\alpha}{}_{j} / M_{i}^{\alpha}$). Therefore, the import matrices were revised based on these surveyed data, and then were balanced manually again.

(3) Compilation of the Japan x Thailand and ROW x Thailand import matrices

In this step, the import matrix from Japan obtained in (2) was first subtracted from the original import matrix of the Thai domestic input-output table, and then the remainder became the import matrix from the Rest of the World. Second, the valuation of the import matrix from Japan was converted into f.o.b. value (from c. i. f.) by subtracting the freight and insurance (=the freight and insurance ratio on imports from Japan times the import value from Japan). Finally, the valuation of the import matrix from Japan was further changed into producers' value by relocating trade margin and transportation costs (see Flow Chart 1-C).

The import matrix from Japan and the import matrix from ROW, were obtained from the above process, with a final valuation of producers' value and c. i. f., respectively. Moreover, imports of services from Japan are contained in the import matrix from ROW, because the import matrix from Japan was originally compiled from the Thai import statistics which covered the imports of goods only, so the imports of services from Japan were still left in the import matrix from ROW.

2.5 Data on Freight and Insurance

In order to compile the import matrix from the partner country, it was necessary to estimate the freight and insurance ratios to the imports from the partner country (see 2.4(3)). For this purpose, CUSRI conducted a survey and gathered the required information from the relevant industries. On the Japanese side, IDE estimated these ratios based on interviews and the publications of Japan Maritime Research Institute[1].

[1]Japan Maritime Research Institute, *Compilation of an Input-Output Table Focused on International Freight Transport* (in Japanese) (Tokyo: Japan Maritime Research Institute, 1988)

2.6 Linkage of Data

At the final stage of the compilation, all of the data compiled in the previous stages were linked and integrated into one bilateral input-output table. In this process, although most of the TIO or JIO sectors were directly converted into UIO through the converters previously developed, some of them were not and could be converted only by disaggregating sectors. The ratios of disaggregation actually applied were, in principle, the shares of the control total or imports. For instance, suppose some portions of sector X(TIO or JIO) correspond to sector α (UIO) and its share of the control total in sector X is , say, 30%, and the rest of sector X corresponds to sector β (UIO). In this case, 30% of sector X goes to sector α and 70%to sector β . These shares of the control total were calculated from the statistics on production, and those of imports - imports from the partner country and imports from ROW, respectively - were obtained from the trade statistics. Finally, exports were converted by changing the converter between the input-output sector classification and the trade classification.

2.7 Statistical Discrepancies

Statistical discrepancies were generated in the compilation process. Column-wise discrepancies were

thought to be due to rounding errors and were merged into the operating surplus (VV002). On the other hand, row-wise discrepancies are more complicated. The possible reasons for this are ; the gap in value between the trade statistics of the two countries ; the mismatch of classifications between the two countries ; the gap in value between the trade statistics and the domestic input-out tables, and rounding errors. All of the row-wise discrepancies were put into the QX001 column.