New Challenges Facing Asian Agriculture under Globalisation

Volume I

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18

Sustainability of the Resource Based Industries in Malaysia

Norini, H.

Introduction

The continuous growth experienced by most resource-based industries (RBIs), especially the forestry and forest-based industries (FBIs), during the past few decades has made us fail to realize the importance of considering other factors that may contribute to sustainable development of those industries. The RBIs in this context include wood-based products, rubber-based products, palm oil (food sector), palm-oil-based products (non-food sector), and coco and coco-based products. The excellent performance by the RBIs can easily be seen from the growing export earnings collected each year. For example, the export earnings from timber products declined from RM14.7 billion in 1997 to RM14.2 billion in 1998, although such earnings again rose to almost RM 16.6 billion in 1999 and RM 17.1 billion in 2000 (Table 18.1). A similar situation can also be observed for natural rubber and manufactured rubber products, as well as for palm oil and palm-oil products. However, between palm oil and palm-oil products, and natural rubber and manufactured rubber products, the former seem to have experienced a drastic increase and fall in export earnings. For instance, the export value collected for palm oil and palm-oil products jumped 78 per cent to RM22.7 billion in 1998, and then declined by 14 per cent (RM19.5 billion) in 1999 and almost 26 per cent (RM14.5 billion) in 2000. An interesting observation is the increasing trend in export values of natural rubber and manufactured rubber products, and palm oil and palm oil products, even though Malaysia faced an economic crisis in late 1997. The impact of such a crisis seems to become visible only after one calendar year. An increase in export earnings experienced by the two main products after the crisis probably was due to orders made the previous year.

Little can be said about export earnings for the RBIs in 2001, as the record is incomplete. Nonetheless, with the global economic slowdown resulting from the tragic incident of September 11, 2001, that hit the United States of America (USA), the likely effect on Malaysia's export earnings from most manufactured products and primary commodities will be substantial.

The extent of the impact on individual products depends highly on the trading partners, i.e., the importers. The trade situation becomes worse if the importer accounts for a high percentage of the total export. One cannot claim that the economic crisis in the Asian region was the sole factor contributing to the decrease in the amount of export earnings collected

Table 18.1: Export Value of Selected Primary Commodities, Malaysia (RM million)

Product	1997	1998	1999	2000	2001[a]
Timber products	14,721.3	14,203.4	16,587.9	17,068.5	8,180.9
Natural rubber and manufactured-rubber products	7,217.8	8,567.3	7,404.6	7,266.1	3,776.8
Palm oil and palm-oil products	12,758.4	22,662.7	19,510.3	14,500.7	8,339.9
Crude petroleum, petroleum products and liquefied natural gas (LNG)	16,640.3	17,661.6	21,825.6	32,776.3	11,691.8

a. denotes from January to July only.

Source: Malaysia, Ministry of Primary Industries (1996, 1997, 1998, 1999, 2000, 2001).

by the RBIs over the past few years. Factors such as availability of the product in question, trade policies of importers, and other related issues also play a role in influencing not only the amount of export earnings collected but also the direction of trade. Worst of all, shocks taking place in the international market have adverse effects, not only on the performance of the RBIs but also on all of the economic activities of a nation. In other words, if the production of certain products depends heavily on imports, an economic crisis or economic slowdown of a nation will make the production less competitive. This is because the production of any commodity usually consumes inputs, not only from the sector itself but also from other sectors in the economy. This also means that should anything go wrong in one sector, other sectors that consume input from the former sector will also be affected. To better appreciate the relationship or inter-industry matrix of the production sector, this paper highlights (a) the basic input-output model, (b) the significance of final demand and primary input content, and (c) the use of such information in decision making, especially in efforts to further sustain the RBIs.

The Input Ouput Model

In the late 1930s, Wassily Leontief developed the so-called analytical framework for the input-output (I-O) model, which is sometimes referred to as inter-industry analysis. Unlike other economic models, the I-O model allows one to trace the movement of goods and services from one sector to another. In connecting industries, Leontief (1951) formulated production equations relating the level of output in each sector to the level of production in all sectors of the economy. Based on these equations, he then worked out a set of simultaneous linear equations relating the relationships of the various sectors in the economy. A simple Leontief simultaneous linear equation can be presented as follows:

$$X_i = \Sigma_{j=1}^{n} x_{ij} + Y_i$$

where:

X_i = total output of sector i

x_{ij} = output of sector i used as input in sector j

Y_i = total final demand for sector i's product

Table 18.2: Example of an Inter-industry Matrix of an I-O Model

	Sector	Purchasing Sector	Total Intermediate	Final Demand	Total Output
	1	x_{11} x_{12} x_{13} ... x_{1n}	W_1	Y_1	X_1
Producing	2	x_{21} x_{22} x_{23} ... x_{2n}	W_2	Y_2	X_2
sector	3	x_{31} x_{32} x_{33} ... x_{3n}	W_3	Y_3	X_3
	n	x_{n1} x_{n2} x_{n3} .... x_{nn}	W_n	Y_n	X_n
Total intermediate inputs		U_1 U_2 U_3 ..... U_n			
Primary inputs		V_1 V_2 V_3 ..... V_n		V	V
Total inputs		X_1 X_2 X_3 ..... X_n		Y	X

Source: Norini (2000).

In discussing the interrelationship between immediate sectors and sectors of final demand, it is important to differentiate the two matrices of producers' accounts (i.e., make and absorption matrices), which form the basis of the I-O table or model. The make matrix records the value of commodities by all activities, whereas the absorption matrix exhibits the value of commodities purchased to produce outputs. When combined, the two matrices form an I-O table. The final-demand quadrant in the context of an I-O table includes private and government consumers, changes in inventory, gross capital formation or investment, and export sectors. To better appreciate the interrelationship between sectors, let us refer to Table 18.2, which illustrates the four main quadrants of an I-O table.

There are four main quadrants in an inter-industry or absorption matrix (Table 18.2). Quadrant 1 is called the transaction matrix. In this matrix, the rows mark the allocation of output from each sector, whereas the columns mark the input by that sector.

For instance, sector 3 in row 3 sells x_{32}, x_{33}, through x_{3n} units of output to all the other sectors in the economy, while reserving some x_{31} for its own use. To say it differently, production from a given sector is consumed not only by the sector itself but also by other sectors in an economy.

At the same time, sector 3 in column 3 also receives or purchases inputs x_{23}, x_{33}, and x_{n3} from other sectors and x_{13} from itself as inputs of production. In Table 18.2, W_3 represents the total intermediate use of sector 3's products, whereas the total purchases of inputs of sector 3 are given by U_3. Similar interpretations are also applicable to the remaining intermediate sectors

Another important column in the absorption or inter-industry matrix is called final demand, usually referred as the second quadrant. The final-demand quadrant, as mentioned earlier, includes private and government consumers, changes in inventory, gross capital formation or investment, and export sectors. The total final demand for the output of sector 3 in Table

18.2 is represented by Y_3. It is important to note that total sales to final demand/users also represent gross domestic product (GDP). Adding GDP and all sales to the intermediate sectors gives the total commodity output available in the economy.

The value-added or primary inputs, consisting of labour, capital, imports, and others, are called the third quadrant. The symbol V_3, for example, represents the entry for sector 3's value-added input, whereas other Vs represent other sectors' value-added inputs (Table 18.2).

The fourth quadrant represents the direct input of primary factors to final use (e.g., domestic services and government employment). According to Chenery and Clark (1959), these entries are seldom recorded in inter-industry models, even though their existence is important. Readers who need to know more about the I-O model and its applications can refer to Blumer-Thomas (1982), Chenery and Clark (1959), Miller and Blair (1985), and Richardson (1972).

Sources of Data

Data used for the I-O model can be obtained from both primary (survey-based data) and secondary sources. Because the focus of the study was on forestry and FBIs, only these sectors were surveyed (Norini, 2000). Such a survey was meant to collect additional data and to study the sector of interest. No attempt was made to include the other RBIs listed in the I-O table; i.e., analyses were based entirely on information that was available. To ensure reliability, all transaction data that were collected from the two sectors were cross-checked with the profit-and-loss accounts of the individual companies involved. Using survey-based data, Norini (2000) developed a partial I-O model for the forestry and FBI sectors, which include forestry and logging, sawmilling and others, plywood/veneer, moulding, laminated board, and furniture and fixtures. The partial I-O model was later incorporated into the existing I-O tables of 1987, developed by the Department of Statistics, Malaysia (1994). Another I-O table developed for 1990 by the Institute of Developing Economics (1997) was also used in the analysis.

Results and Discussion

As mentioned earlier in this paper, and stressed again in this section, because the focus of research was on the forestry and FBIs sectors, analyses of the other RBIs were entirely based on I-O tables compiled by the Department of Statistics and the Institute of Developing Economics. This also means that discussion of results of the various analyses was based on an aggregated version of the I-O table.

Table 18.3 clearly indicates that forestry and a majority of the sub sectors of the FBIs have strong reliance on the export sector of final demand (Norini, 2000). Similar reliance on exports was also observed for the agriculture, livestock, and fishing sectors combined, in 1987 (Table 18.3), even though the reliance was not as high as that by forestry and FBIs. Nonetheless, the percentage (almost 50%) recorded for agriculture, livestock, and fishing can be considered reasonably high in terms of dependence on the export sector.

Table 18.3: Final Market/Demand of Resource-based Industries in 1987, Malaysia (in percentage)

Sector or Industry	Exports	Stocks	Private Consumption	Investment
Forestry and logging	87.15	Nil	3.32	9.10
Sawmilling and others[1]	69.50	Nil	5.81	24.23
Plywood/veneer	72.44	0.70	2.11	23.50
Moulding	97.07	Nil	0.45	3.03
Laminated board	30.97	Nil	2.93	62.84
Furniture and fixtures	25.77	1.26	66.17	6.24
Agriculture, livestock and fishing	49.40	1.73	37.18	10.21

Source: Norini (2000).

[1]Includes other wood products.

Of the six FBIs identified in 1987, three indicated strong dependence on exports, namely, the moulding, plywood/veneer, and sawmilling sectors. On the other hand, furniture and fixtures indicated only 26 per cent dependence on the export sector of final demand in 1987. Such a low percentage shown by furniture and fixtures as a sector can easily be explained. First, the production of the furniture and fixtures sector at that time was based on indigenous timber species. The production was not only small but it was also meant more for domestic consumption (Table 18.3). Second, rubber wood, which currently is the leading raw material for the furniture and fixtures sector, came onto the scene only in the late 1980s and early 1990s and was, in fact, a by-product of the rubber-replanting program. Therefore, it is not surprising that the export share was less than the shares of other sectors of final market, such as private consumption and investment.

Table 18.3 also indicates that none of the forestry, FBIs, or agriculture sectors combined had a strong relationship with the investment sector except for the laminated-board sector, even though investment is also an important sector of final demand.

Of the three sectors identified in 1990, forestry and logging seemed to depend most highly on the export sector, with 90.37per cent of its production destined for that sector (Table 18.4). Furniture and fixtures (51.34%) and sawmilling and others (47.52%) followed the same trend (Table 18.4). The difference this time is that the share directed to the export sector by the furniture and fixtures sector improved almost doubled over a period of three years. With regard to the agriculture, livestock, and fishing sectors combined, the percentage destined to the export sector did not change much, i.e., from 49.40 per cent in 1987 to 43.09 per cent in 1990. Higher percentages given for the forestry and logging sector, three FBIs, and agriculture, livestock, and fishing combined in 1990 and 1987 also indirectly indicate that the industries depend heavily on the export market. This means that, should anything happen to the local or global economy, these sectors will be badly hit.

Table 18.4: Final Market Demand of Resource-based Industries in 1990, Malaysia (in percentage)

Sector or Industry	Exports	Stocks	Private Consumption
Forestry and logging	90.37	3.88	5.35
Sawmilling and others[a]	47.52	31.95	17.44
Furniture and fixtures	51.34	Nil	56.88
Agriculture, livestock and fishing	43.09	6.43	49.07

Source: Norini (2000).

[a]Includes other wood products.

Analyses derived from the I-O table of 1990, developed by the Institute of Developing Economies, also indicated that only a small percentage of the production from forestry and logging, and sawmilling and other sectors, was destined for private consumption. On the other hand, private consumption consumed more than half of the total production from furniture and fixtures treated as a sector. Indirectly, this indicates that the private sector is just as important as the export sector. Similarly, the importance of private consumption also applies to sectors such as agriculture, livestock, and fishing combined, as well as transportation and communication. These sectors recorded private consumption percentages of 49.07per cent (Table 18.4) and 52.54 per cent respectively (Norini, 2000). On the other hand, the forestry and FBIs (except for the furniture and fixtures sector) indicated only a small percentage of production destined for private consumption in 1987. With regard to stock formation, only sawmilling and other sectors indicated reasonably significant dependence on stock in 1990. The forestry and logging, furniture and fixtures, and agriculture, livestock, and fishing sectors combined indicated less than 3 per cent, 0 per cent, and 6.4 per cent dependence on stock, respectively.

Another important aspect of the I-O table that is worth discussing is primary input content, consisting of imports, commodity taxes, value added, and salaries and wages. Unfortunately, because of a paucity of data, only the import and value-added sectors of primary input content could be analysed for 1990 (Norini, 2000). Analyses of the RBIs in the I-O table of 1990 indicated that the sawmilling and others sector, and the agriculture, livestock, and fishing sectors combined had moderate requirements per unit of final demand compared to the forestry and logging sector. On the other hand, the furniture and fixtures sector had a higher requirement per unit of final demand. In other words, to obtain an increase of one unit of final demand, imports had to rise by 0.1542 for the forestry and logging sector, 0.3277 for the sawmilling and others sector, 0.1684 for the agriculture, livestock, and fishing sectors combined, and 0.3978 for the furniture and fixtures sector (Table 18.5).

The reasonably high import requirement to produce a unit of output for furniture and fixtures as a sector should be of concern to policy makers. Similarly, attention should be focused on the sawmilling and others sector because of its high import requirement in 1990 compared with 1987. The high import requirement in this context means that the higher the production of furniture and fixtures, and sawmilling and others, the greater will be the imports. Therefore,

Table 18.5: Primary Input Content of Final Demand of Resource-based Industries, Malaysia (1990)

Sector or Industry	Imports	Value-Added[b]
Forestry and logging	0.1542	0.8456
Sawmilling and others[a]	0.3277	0.6718
Furniture and fixtures	0.3978	0.6018
Agriculture, livestock and fishing	0.1684	0.8314

Source: Norini (2000).

[a]Includes other wood products. [b]Includes salaries and wages.

Table 6: Primary Input Content of Final Demand of Resource-based Industries, Malaysia (1987)

Sector or Industry	Imports	Commodity Taxes on Domestic Production	Value-Added	Salaries and Wages
Forestry and logging	0.0957	0.0063	0.6541	0.2333
Sawmilling and others[a]	0.1239	0.1196	0.4959	0.2527
Plywood/veneer	0.1116	0.0657	0.5460	0.2580
Moulding	0.1192	0.0822	0.3666	0.4241
Laminated board	0.1650	0.0817	0.4913	0.2550
Furniture and fixtures	0.2130	0.0418	0.4050	0.3121
Agriculture, livestock, and fishing	0.1140	0.0042	0.6610	0.2109

Source: Norini (2000).

[a]Includes other wood products.

some attention needs to be focused on the input structure of said products. To say it differently, efforts should be made to reduce importation as much as possible. An increase in the import requirement for every unit of output for furniture and fixtures above the figures for 1987 is probably a result of the expansion in production and the export-oriented policy adopted by manufacturers. The import requirement recorded for the furniture and fixtures sector in 1987 was 0.213 (Table 18.5), as compared to 0.3978 in 1990 (Table 18.6). On the other hand, the import requirement for the sawmilling and others sector in 1987 was 0.1239 (Table 18.5), as compared to 0.3277 (Table 18.6) in 1990. An interesting feature is the increasing trend of import requirements for the production of furniture and fixtures as a sector, over the years. Clearly, an indication such as this can act as a check and balance for the Ministry's concern about what policies to adopt to reduce the sector's dependence on imports. However, before any policy can be recommended, a study on imported materials needed for the sector's production must be carried out. Learning more about the sector and recommending an appropriate policy is only possible through such a study.

An increasing trend in import requirements indicated by the agriculture, livestock, and fishing sector over the years also should be of immediate concern, even though the changes may

not be that significant. The fact that there have been changes in import requirements may also mean that, over time, the production of such products will no longer be competitive if measures are not taken to improve the situation.

Among the RBIs, the forestry and logging sector and the agriculture, livestock, and fishing sector had high value-added input content of 0.8456 and 0.8314, respectively, for every unit of output, compared with 0.6718 for sawmilling and others and 0.6018 for furniture and fixtures in 1990 (Table 18.5). Value added is the difference between the value of gross output and the cost of input. It is the increment in the value of commodities and services contributed by the establishment (Department of Statistics, 1999). Other economic sectors that had high value-added content in 1990 were mining and quarrying (0.8761), finance and insurance (0.8044), government services (0.8078), and other services (0.8113) (Norini, 2000). Other services include hotels, cinemas, shipping services, and so on. Similar observations were made for the forestry and FBIs in 1987.

Analysis based on I-O tables of 1987 also indicated that the furniture and fixtures sector and the agriculture, livestock, and fishing sector had high salaries and wages content for every unit of output, compared to other RBIs. This indirectly indicates that furniture and fixtures is a labour-intensive sector. Another reason for the high salaries and wages reported is the labour cost per employee in Malaysia. Using works by Rama and Artecona (1999), the value added created per US$ of labour cost between 1995 and 1999 was calculated to be 3.95 for China and 3.69 for Malaysia (Norini, 2002). This means that value added per US$ paid to employees was much higher in China than in Malaysia. In other words, China is more labour-cost competitive in producing manufactured goods, inclusive of wooden furniture, than is Malaysia. If one is to compare the value added per US$ paid to employees with Indonesia, Malaysia's closest neighbour, the figure is 5.2. This means that Indonesia is more labour-cost competitive than is China. Nonetheless, considering the massive workforce, the stability of the country, and other factors, China may be a better country for an investment.

Conclusion

Analyses carried out on final market demand of certain sectors and primary input content of final demand indicated that special attention should be focused on sectors that not only rely heavily on exports but also need more imported inputs for production. A high dependence on the export sector can make matters worse if concentration is only on a few major markets. No doubt, more foreign exchange earnings will be gained through selling in the international market, but the fact that the export market dictates the production of any one product is considered unhealthy. RBIs identified as having this characteristic include the logging and furniture and fixtures sectors. In terms of market concentration, a majority of the furniture and fixtures production from Malaysia is sold to the USA. The implications of the recent terrorist attacks on the USA for export earnings are predicted to be substantial. With regard to the agriculture, livestock, and fishing sectors, even though the concentration was not as substantial as in the forestry and furniture and fixtures sectors, the fact that almost 50 per cent of the production was destined for the export sector should also be of concern.

Another aspect that needs immediate attention is the dependence of certain sectors of the RBIs on imports as an input in production. For example, furniture and fixtures has been identified as the sector that had the highest import requirement per unit of production in 1987 and 1990. In other words, should producers wish to increase their output, more of their input needs to be imported. To overcome the problem of imports for the furniture and fixtures sector, understanding the detailed types of inputs currently used by that sector should be the primary focus. On the other hand, the high import requirement shown by the sawmilling and others sector in 1990 could be due to the aggregation of sectors. This indirectly indicates that disaggregation of sectors in such an analysis is crucial in understanding individual sectors' behaviour.

Various analyses based on the 1987 and 1990 I-O tables have also shown that, to be able to sustain the performance of any sector, attention should be focused not only on product and market diversification but also on factors such as final demand and primary input content. The process of combining information derived from the I-O analyses with other information would mean that future planning for any sector is carried out in a more holistic manner. Such an approach will assist planners with better decision making.

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