

## Chapter 3 FOREST-RELATED INDUSTRIES AND TIMBER TRADES OF MALAYSIA

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### 1. INTRODUCTION

Raw log production in the world has increased over 50% during the last three decades. China, India, Malaysia and Indonesia are the major Asian producers of logs. In particular, Malaysia and Indonesia have been both the largest producers and exporters of logs since the late 1960s, in the face of rapid declines of their forest resources. On the other side of the trade, Japan and Korea are the big importers of timber, while their forests are steadily growing.

On a global scale, the loss of forests has a variety of causes, one of which is the lack of regional balances in wood production and consumption. On the other hand, wood is a necessity for human life and has become a major item of world trade. Accordingly, achieving sustainable use of forest resources will necessitate a system that takes a new view of production and consumption from the perspective of the wood trade, and balances use with the growth of forests.

Worldwide trade of wood products, especially in the Pacific Ocean region, have changed drastically in recent years. First, some of timber-exporting countries have enforced log export restriction policies since the late 1980s, for example USA, Indonesia and Malaysia. Timber export restriction policies of these major exporting countries have had great influence on the worldwide timber trade. These restriction policies are introduced due to forest degradation, deforestation and environmental movements in some cases, and for economic development and resource nationalism in others. Second, plantation logs have been increasing gradually compared to natural logs in both production and international trade. Problems are, in most cases, caused by too much harvest as compared with forest growing. New Zealand and Chile now have an important role as large exporters of plantation logs. Third, the major wood items of global trade have been shifting from raw logs to processed wood such as laminated wood, particle board, oriented strand board, and so on. In the Asian region, these wood items are increasing gradually following the pattern of European countries, taking the place of lumber and plywood.

This report studies the case of Malaysia to obtain an understanding of the structures and analyze current state of its timber trade. Malaysian timber trade has been changing drastically in recent years under the influences of the international timber trade and the country's new scarcities of useful forest resources.

### 2. Export Restriction Policies of South-east Asian countries

#### 2-1 Overview of Log Export Restrictions

Southeast Asian countries have played an important role as suppliers in international wood markets since the 1960s, especially for the Japanese and Korean wood markets. Both countries have utilized the imported tropical hardwood mainly in the form of plywood.

Among Southeast Asian countries, the first forest exploitation started with the Philippines as the largest timber-importing country because of its comparatively high quality logs and its vicinity to Japan. The Philippines had been the main supplier of tropical logs under the free timber trade scheme since the late 1950s (Fig. 1).

Forest exploitation of Sabah started in the 1960s, to supply the Japanese timber market. Indonesian forest exploitation was actively done since the late 1960s, when forest exhaustion in Philippines became apparent. Both Indonesia and Sabah had taken over the role of main suppliers to

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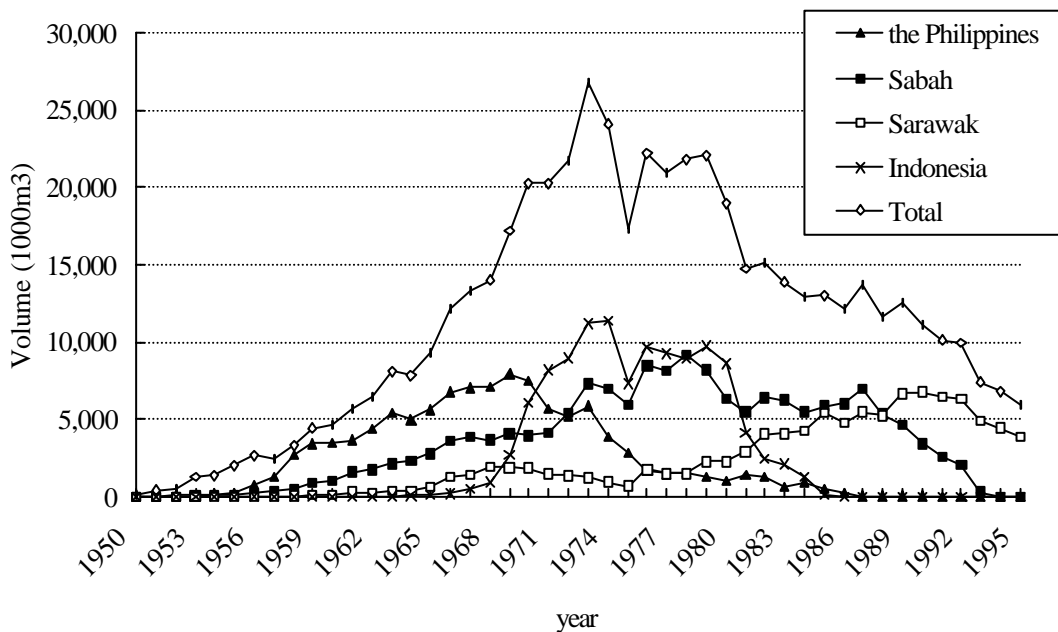
the international timber markets since the middle of the 1970s, especially to Japanese timber market.

Meanwhile, the full emergence of “resource nationalism on forest resources” in Southeast Asian countries resulted in the establishment of SEALPA (Southeast Asia Lumber Producer’s Association) in 1974 in order to influence international timber markets. SEALPA was composed industry associations of major timber-exporting countries such as Indonesia, Sabah and the Philippines: Masyarakat Perakayuan Indonesia, Timber Association of Sabah, Sabah Foundation, Philippine Lumber & Plywood Manufacturers’ Association, and Philippine Chamber of Wood Industries. The log export restriction policies in Southeast Asian countries became a step closer with the establishment of SEALPA.

Indonesia intensified its log export regulations gradually from 1980 to 85 under its new forestry policy, which aimed to promote exports of plywood and lumber. Log exports from Indonesia decreased from 18 million m<sup>3</sup> in 1979, to 6 million m<sup>3</sup> in 1981, and to 3 million m<sup>3</sup> in 1983. Indonesia tightened its regulations and banned log export in 1985, instead providing subsidies for plywood exports to “new markets”; especially to Japan and Korea. Indonesia has now begun to impose restrictions on the export of low quality lumber in order to reserve raw logs for the plywood industry. These policies made Indonesia one of the biggest plywood suppliers in the world.

On the other hand, Sabah had played an important role as a major tropical log supplier to Japan until the beginning of the 1990s. The first restrictions on log export from Sabah were planned in 1976, shortly after the establishment of SEALPA in 1974. Sabah, however, did not materialize any log export restrictions in spite of many plans to do so. The main reason was the financial dependence of Sabah State government on the timber-related revenues, especially from export log royalties. Sabah did not want to decrease its timber harvest and to cut off log royalties, which accounted for almost half of the State revenue. The governmental revenue has depended heavily on the timber-related revenues as follows, 71 % (RM 1,099 million) in 1980, 51% (RM 1,081 million) in 1988, and 38% (RM 578 million) in 1996. The Sabah State government had continuously harvested in excess of forest growth resulting in forest exhaustion (Tachibana, et. al., 1995). Sabah has taken steps to promote wood-processing industries since the end of the 1980s, however, the scarcity of its forest resources became conspicuous and serious in the late 1980s. After all, today the promotion measures are still not yet a being implemented on a major scale and Sabah was forced to ban its log exports in from 1993 to 1996 all.

The extent of forest exploitation in Sarawak fell far behind the above countries because of lower quality of its logs (Araya, 1998). Furthermore, since the financial affairs of Sarawak did not



**Fig. 1: Japanese Imports of South Sea Timber**

Source: the Ministry of Finance, Boeki Tokei

heavily rely on its timber-related revenues, Sarawak State continues to have relatively rich forest resources. Sarawak State became the main tropical log supplier in the South-east Asian region in the place of Indonesia since the late 1980s. Sarawak, however, started log export quota measures since 1992 and reduced log exports in 1990s as follows: 15.8 million m<sup>3</sup> in 1991, 9.1 million m<sup>3</sup> in 1993 and 7.8 million m<sup>3</sup> in 1995. On the other hand, Sarawak has taken measures to promote the development of wood processing industries, especially the plywood industry.

Peninsular Malaysia had partly banned log exports since 1972, and banned them completely starting in 1985. For the last decade, Peninsular Malaysia has promoted the development of the furniture industry, whose raw material is the plentiful rubber wood.

## **2-2 Impacts of the Log Export Bans**

Southeast Asian countries started log export restriction since the late 1970s. In particular, the log export ban policies of Indonesia in 1985 and of Sabah in 1993 had serious influences both on these exporting countries and on timber importing countries, including Japan and Korea.

Recently Japanese tropical log imports have been decreasing remarkably under the two log export restriction policies and because of the exhaustion of forest resources in the Southeast Asia region. To mitigate this serious situation facing the Japanese plywood industry, the production of compound plywood and softwood plywood has increased in the 1990s in Japan. Compound plywood is made of both hardwood and softwood, including Siberian logs and radiata pine logs. On the other side, Papua New Guinea has increased log exports for the last decade.

This report surveys here two studies concerning the impacts of the log export ban policies of Southeast Asian countries.

Manurung (1995) studied the economic impacts of the log export ban policy on the development of forest products industries of Indonesia. His study showed that the impacts on net employment and foreign earnings from the policy changes were not so large.

Tachibana and Nagata (1998) revealed the impacts of the log export ban policies of Southeast Asian countries on the Japanese plywood market, for which the supply mainly comes from Southeast Asian and domestic plywood industries. Their econometric analysis pointed out the following; The log export ban policy of Indonesia, along with its plywood industry promotion policy, had increased plywood exports from South-east Asia to Japan, leaving the log supply rather untouched. Sabah's log export ban policy had decreased log exports from Southeast Asia to Japan. The producers' surplus of Southeast Asian plywood industries had increased after the log export ban policy of Indonesia. The consumers' surplus in the Japanese plywood market had increased accordingly. On the other hand, the producers' surplus of the Japanese plywood industry had decreased significantly with both export bans. These log export bans led to large profits to plywood industries of Southeast Asia, and that resulted in costs which were levied on the Japanese plywood industry.

This paper now addresses some econometric models for the Japanese timber trade.

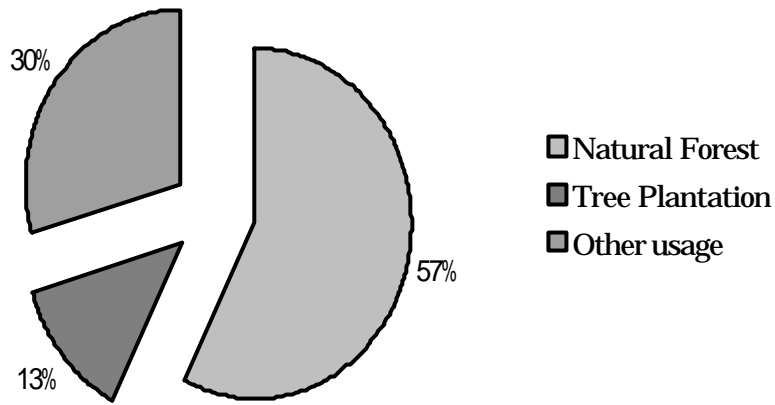
Yukutake et al. (1996) built a whole scale forest sector model in Japan in order to analyze the long-term timber trade flow between Japan and North America. It indicated a relationship between Japan and major timber exporting countries, by developing the Japanese timber sector on econometric models. The timber trade model of the analysis showed that the Japanese timber market was influenced significantly by the United States' regulation measures placed on its timber harvest since the late 1980s. In addition, Tachibana and Nagata (1996) revealed an impact of the timber harvest restrictions in the U.S. on the timber trade between Japan and North America.

Vincent et al. (1991) examined Japanese timber import structure of sawlogs econometrically. They conclude that saw logs from North America, the Soviet Union and the South Seas were substitutes for each other from 1970 to 1989, and that the import of timber from each region was affected by its relative "net" price.

**3.FOREST, FOREST POLICY AND FOREST RELATED INDUSTRIES IN MALAYSIA: POLICY STUDY 2**

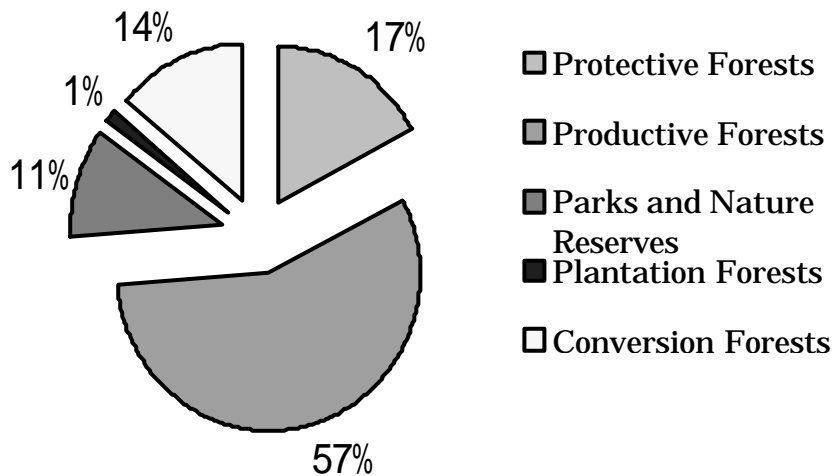
**3-1 Land Use and Forest Resources**

Total land area in Malaysia is 32.86 million ha. Malaysia is composed of three parts administratively: Peninsular Malaysia (13.16 million ha, 40%), Sabah State (7.37



**Fig. 2 Forest and Tree Covered in Malaysia**

Source: MPIM (1997) Malaysian Report on the Progress toward the Achievement of ITTO 2000 Objective



**Fig. 3 Natural Forest in Malaysia**

Source: MPIM (1997) Malaysian Report on the Progress toward the Achievement of ITTO 2000 Objective

million ha, 22%) and Sarawak State (12.33 million ha, 38%). The forest and tree covered land of Malaysia is 23.14 million ha (approximately 70% of land area): 18.87 ha of natural forest and 4.27 million ha of tree plantations (Fig. 2). Tree plantations such as rubber and oil palm are an increasing in importance as sources of timber materials.

The forests of Malaysia are 18.87 million ha which consist of five categories: 3.33 million ha of protective forests, 10.87 million ha of productive forests, 2.12 million ha of parks & nature reserves, 0.192 million ha of plantation forests and 2.67 million ha of conversion forests (Fig. 3). Plantation forests are established in order to relieve the pressure on the national forests as well as to supplement future wood supply, carrying high yield of timber per unit area and with shorter rotations. The

species of plantation forests are composed of tropical pines such as *Pinus caribaea* and *P. merkusii*, fast-growing, hardwoods such as *Acacia magnium* and *Gmelina arborea*, and others such as *Tectona grandies* and *Shorea macrophylla*.

**Table 1 Distribution and Extent of Major Forest Types in Malaysia: 1995**

Region	Land Area	<i>Dipterocarp</i> Forest	Swamp Forest	Mangrove Forest	Plantation Forest	Total Forested Land	(million ha, %)	
							Percentage of Total Land	of Forested Land
Peninsular Malaysia	13.16	5.38	0.30	0.10	0.07	5.85	44.5	
Sabah	7.37	3.83	0.19	0.32	0.11	4.45	60.4	
Sarawak	12.33	7.20	1.20	0.20	0.01	8.61	69.8	
Malaysia	32.86	16.41	1.69	0.62	0.19	18.91	57.5	

Source: Ministry of Primary Industries, Malaysia (1997) Malaysian Report on the Progress towards the Achievement of ITTO Year 2000 Objective

**Table 2 Permanent Forest Estates in Malaysia: 1995**

Region	Protection Forest	Production Forest	Total Land under Forest Estate	(million ha, %)	
				Area	Percentage of Total Land Area
Peninsular Malaysia	1.90	2.78	4.68	35.6	
Sabah	0.53	3.07	3.60	48.8	
Sarawak	1.00	5.00	6.00	48.7	
Malaysia	3.43	10.85	14.28	43.5	

Source: Ministry of Primary Industries, Malaysia (1997) Malaysian Report on the Progress towards the Achievement of ITTO Year 2000 Objective

The Malaysian government has put great emphasis upon the shift from single-use to multiple-use of forest resources and management. They take into consideration that forests are not only for timber production but also for other equally important protection functions such as: conservation of biological diversity, water protection, environmental protection and meeting societal needs. This approach is evident in the "Vision 2020" of the Prime Minister: "... we need also ensure that our valuable natural resources are not wasted. Our land must remain productive and fertile, our atmosphere clear and clean, our water unpolluted, our forest resources capable of regeneration, able to yield the needs of our national development. The beauty of our land must not be desecrated-for its own sake and for our economic advancement"(hearing from Malaysian Timber Council).

The distribution and extent of major forest types in Malaysia in 1995 are shown in the table (Table 1). Percentages of total forested land are as follows: 57.5% in Malaysia, 44.5% in Peninsular Malaysia, 60.4% in Sabah and 69.8% in Sarawak. Owing to the latest forest exploitation, Sarawak leaves a good deal of forested land in comparison with other parts, having a lot of *dipterocarp* and swamp forests. While Sabah has relatively big mangrove and plantation forests, it does not have sufficient forests.

Malaysia maintains 14.28 million ha (43.5%) of its total land area in permanent forest estates. Both Sabah and Sarawak have the same ratio of 49% of total land area. Protection forest in permanent forest estate of Peninsular Malaysia is 1.9 million ha in extent.

### 3-2.Forest Policy and Forest Management Practices

The national forest policy of Malaysia set up in 1978, having three objectives. The first objective is the sound climatic and physical condition of the country: the safe-guarding of water supplies and soil fertility, and the minimization of damage by floods and erosion to rivers and agricultural lands. The second objective is the conservation of adequate forest areas for recreation, education research and protection of the country's flora and fauna. The third objective is the supply in perpetuity and at reasonable rates of forest produce for further processing, manufacturing and

export.

Forest Management practices in Malaysia are subdivided into seven categories as follows:

- (1) Annual coupe: Established for each state based on detailed forest inventory for sustained yield management and annual coupe scaled down as follows:
  - 5<sup>th</sup> Malaysia Plan (1986-1990) – 71,200 ha
  - 6<sup>th</sup> Malaysia Plan (1991-1995) – 52,250 ha
  - 7<sup>th</sup> Malaysia Plan (1996-2000) – 46,040 ha
- (2) Pre-felling Inventory: To provide reliable estimates of tree stock to promulgate optimum management regime
- (3) Selective Harvesting: 7 to 12 trees per hectare with a residual stock of about 32 tree, of 30cm d.b.h. (diameter at breast height) and above based on a rotation cycle of 30-50 years, depending on forest type
- (4) Minimum Cutting Limits: At least 45 cm d.b.h.
- (5) Directional Felling: As prescribed to minimize damage to the surrounding environment
- (6) Post-Felling Inventory: To determine residual stocking and appropriate silvicultural treatment
- (7) Other Guidelines: Forest Management Plan Standard Road Specifications Forest Harvesting Procedures

National Forest Policies of Malaysia are updated under the amendment to the National Forestry Act 1984. Utilizing police and armed forces to assist to curb illegal logging, the law carries severe penalties as follows; A fine for the violator of the SFM rules increased from RM 10,000 to RM 500,000. Mandatory prison sentence prescribed from 1-20 year.

The National Committee (NC) on Sustainable Forest Management (SFM) in Malaysia formulated a total of 92 activities to operationalize ITTO's 5 criteria and 27 indicators at national level. NC also identified a total of 84 activities to be implemented at the Forest Management Unit system (FMU) level under ITTO's criteria and 23 indicators for SFM. In formulating the 92 and 84 activities at the national and FMU level respectively, NC reviewed the Principles of Forest Stewardship Council (FSC), the German Tropenwald Initiatives as well as other initiatives.

The Malaysian Criteria and Indicators (MC&I) for SFM are as follows: Pilot study on timber certification was initiated in the middle of 1996 under the ambit of the Malaysia - the Netherlands joint working group. Three participating states (Terengganu, Pahang and Selangor) were chosen as the Forest Management Unit system (FMU). 4 Malaysian exporters and 5 Dutch importers participate in the project. Assessment was carried out in accordance to MC&I phased approach. And furthermore, chain-of-custody assessment put into practice in compliance with the SGS (international company) qualifier program.

The 9,000 cubic meters of sawntimber have been shipped to the Netherlands up to August in 1998. This volume includes shipments by new participating companies that have been awarded chain-of-custody certificates by SGS. The number of timber importers participating in the study has increased to 9 from the original 5 companies while Malaysian exporters increased to 29 from original 4.

Reassessment of the pilot study was done in 1998. Surveillance visits, in addition to the first exercise to monitor compliance with the MC&I have been carried out in Selangor in May, Pahang in June and Terengganu in July and August. As the result, there have been improvements in the forest management since the first audit. The pilot study expands to other 5 States in Peninsular Malaysia.

The 13<sup>th</sup> Meeting of the National Forestry Council meeting approved the setting up of the National Timber Certification Center (NTCC), which would be responsible for planning and implementing timber certification program in Malaysia. NC on SFM had agreed to an allocation of RM10.6 million as an endowment fund for setting up operations of the NTCC.

### **3-3. Activity of Forestry and Timber Sector**

#### **a. Wood based industries**

The economic growth rate of Malaysia has been more than 5% per year since the 1960s; 6.5% in the 1960s, 8.1% in the 1970s, 5.98% in 1980s, 8.3% in 1993, 9.6% in 1995. Contributions of

Malaysia's agriculture, forestry and fisheries were 14% of GDP in 1995 and 29% of the working population in 1994. Both contributions have decreased by half for the last three decades.

The forestry and timber sector contributed about 5 % to GDP, US\$ 5.35 billion to export earnings and 245,000 people to the working population in 1997. The authorities concerned explain factors contributing to timber industrialization like that; political stability, role of Government Department and Agencies, adequacy of raw material supply, adequate infrastructure and supporting facilities, Government incentives, favorable global and domestic demand for timber products, technical support through R&D and role of private sector.

I can illustrate the structure of forest related industries in Malaysia as follows:

- <Peninsular Malaysia>
- Sawntimber
- Panel products: plywood, medium density fiberboard (\*),  
particle board
- Molding: builders carpentry and joinery (BCJ \*), flooring
- Furniture (\*)
- <Sabah>
- Logs
- Plywood (\*)
- Sawntimber (\*)
- <Sarawak>
- Logs (\*)
- Plywood (\*)
- Sawntimber
- Wood residue products (\*): Medium density fiberboard, particle board, oriented  
strand board
- Others: molding (\*), flooring and pulp & paper (\*)

The asterisk items are key commodities. Peninsular Malaysia encourages medium density fiberboard, builders carpentry and joinery (ex. frames of windows and doors) and joinery and furniture made from rubber wood. The encouraging wood items of Sabah are plywood and sawntimber. Sarawak particularly promotes plywood, wood residual products and pulp and paper, making four industrial estates in the coastline and the new industrial zone "Tanjung Manis Timber Processing Zone" near the mouth of the Rejang River.

The Tanjung Manis Timber Processing Zone and a joint venture in Sarawak both deserve special mention.

The zone is developed into four phases over a 20 year period. The first stage involving 200 ha was developed between 1990 and 1995. Foreign companies set up nine wood-based mills such as plywood mills, veneer mills, sawmills, wood-chip mills and furniture making mills with a population of about 3,000 workers. Development of the second stage involving a similar size began in 1996 and will be completed in 2000. They hope to make the Zone the fastest growing port in Sarawak attracting about 30,000 to 40,000 local and foreigners to work at the timber complex by the year 2000. In the plan, the third stage that covers 1,000 ha is set to develop between 2001 and 2005. While the fourth and last stage involving 600 ha is scheduled to implement between 2006 and 2010.

PUSAKA (Sarawak Timber Industry Development Corporation) enters into a joint venture with Asia Pulp and Paper Company Ltd. in Tatau. The joint venture established Borneo Pulp and Paper Sdn. Bhd. (BPP) which has a full production capacity of one million tons of pulp per year and 7,000 job opportunities for the local people. Resources for the mill would be substantially obtained from the well managed and environmentally recommended plantation forest of fast growing species. Of this, the State government of Sarawak had allocated one million hectares of land to plant one billion fast growing *Acacia mangium* trees over the next 15-20 years. The project is also in the line with the state government's effort to maximize usage of its forest resources and encourage the development of industrial forest plantations in Sarawak. They expect BPP to become the forefront of the pulp and paper industry not just in Malaysia but in the region as well.

**b. Production and exports**

In Malaysia, total number of wood processing mills and factories has increased in recent years as shown Fig. 4. Sawmills have leveled off at about 1,150 in this period, while the others has increased steadily. There is a deference between wood based industries of three regions. Sawmills in Sabah and Sarawak have increased from 1993 to 1996 as follows: from 201 to 235 in Sabah, 210 to 240 in Sarawak, promoting measure to the wood processing industries. Plywood mills show a consistent tendency to go increase as well. Especially, Sarawak vigorously pushes forward a

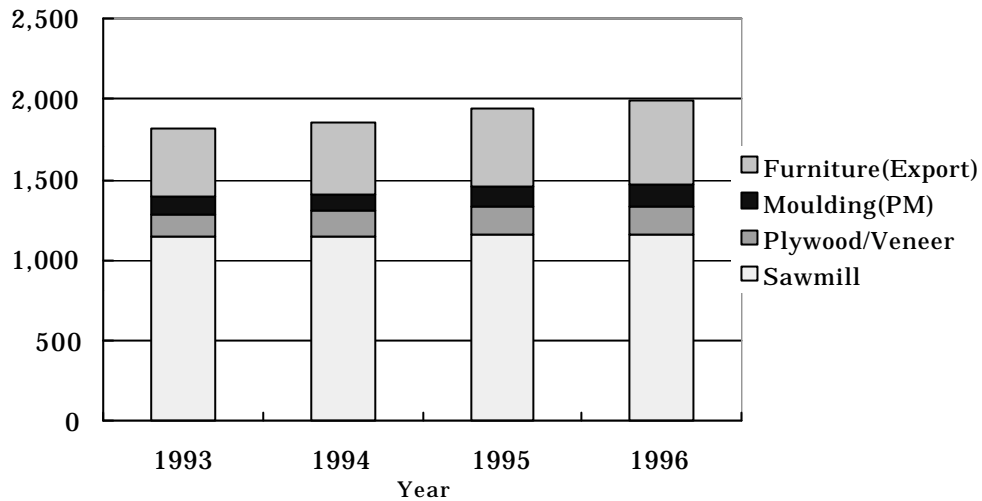


Fig. 4 Wood Processing Mills and Factories in Malaysia  
Source: MTIB

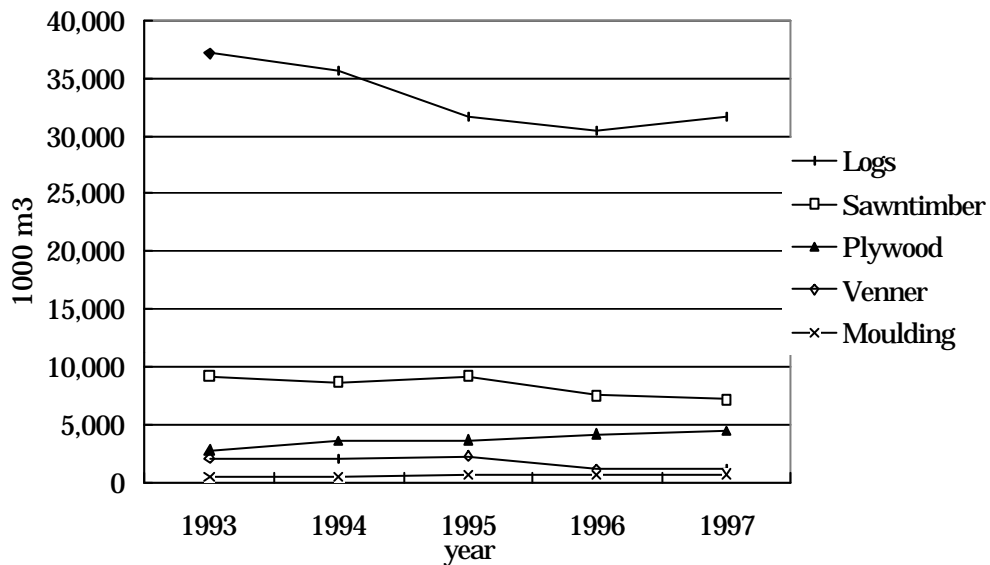


Fig. 5 Production of Logs and Timber Products of Malaysia  
Source: MITB

promotion policy to wood based industry as mentioned above. Meanwhile, most of furniture and moulding factories, which are located in Peninsular Malaysia, have increased more than 20% for 1993 to 1996 under the first and second Industrial Master Plans of Malaysia.

Seen productions of logs and timber products in Malaysia in Fig. 5, log production shows a



tendency to diminish. Sabah and Sarawak have severally started reducing measure of log production

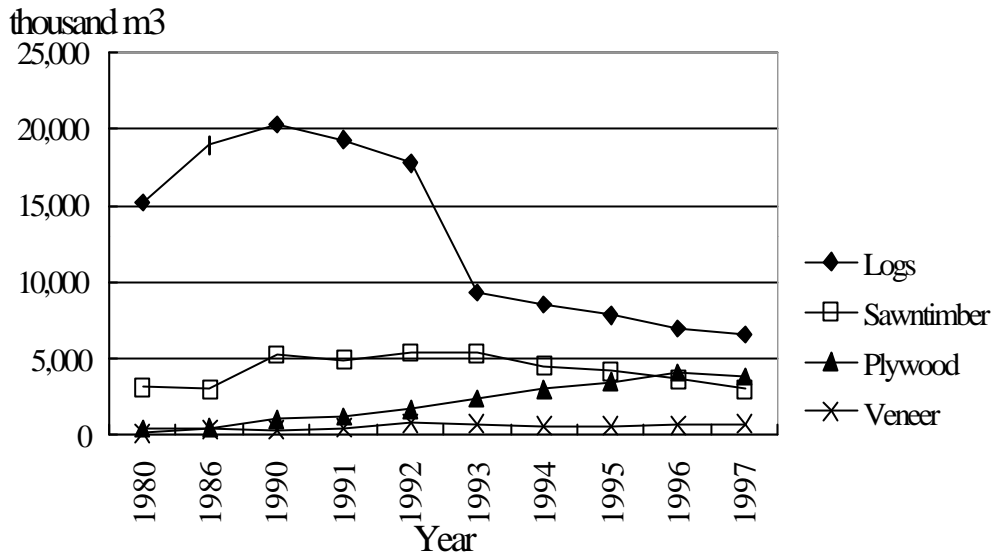


Fig. 6 Export Volumes of Timber Products from Malaysia

Source: MTIB

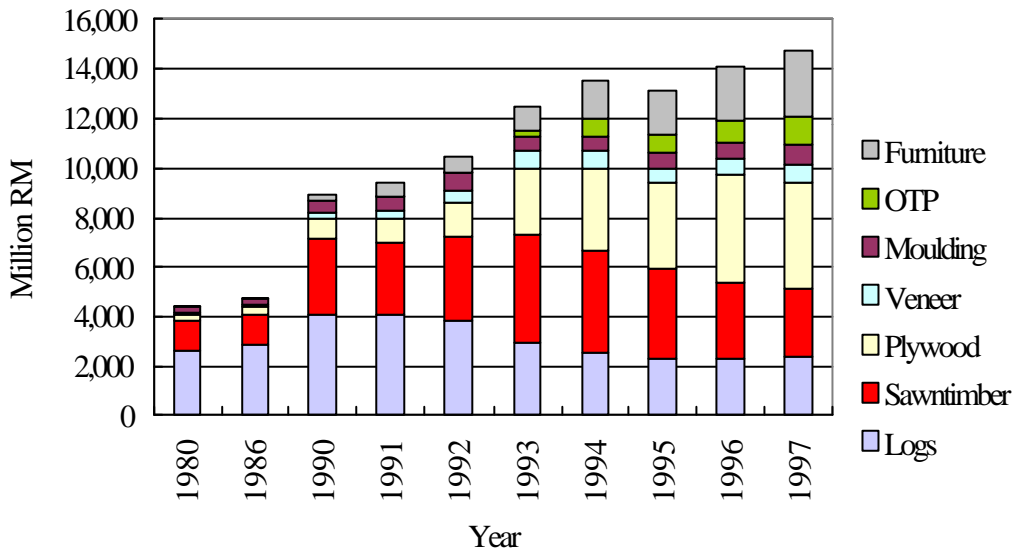


Fig. 7 Malaysia's Export Values of Major Timber Products

Source: MTIB

and export in the 1990s. Log production of Sabah and Sarawak is as follows: 8.4 million m<sup>3</sup> and 18.8 million m<sup>3</sup> in 1990 to 6.4 million m<sup>3</sup> and 16.1 million m<sup>3</sup> in 1996 respectively. Production of plywood has increased gradually of late years, as Sarawak increased plywood export. Sawntimber and veneer have decreased drastically for last two years, while moulding production has increased gradually.

The Fig.6 shows the export volumes of timber products from Malaysia. The log export ban of Sabah and log export quota of Sarawak resulted in a 47% reduction in Malaysian log export volume in 1993, dropping to 76% of the export value (Fig. 7). Besides the export volume of logs has been decreasing slowly since 1993. Taking account of Fig. 5 and Fig. 6, this means the wood processing industry of Malaysia has been developing. And furthermore, export volume and value of sawntimber

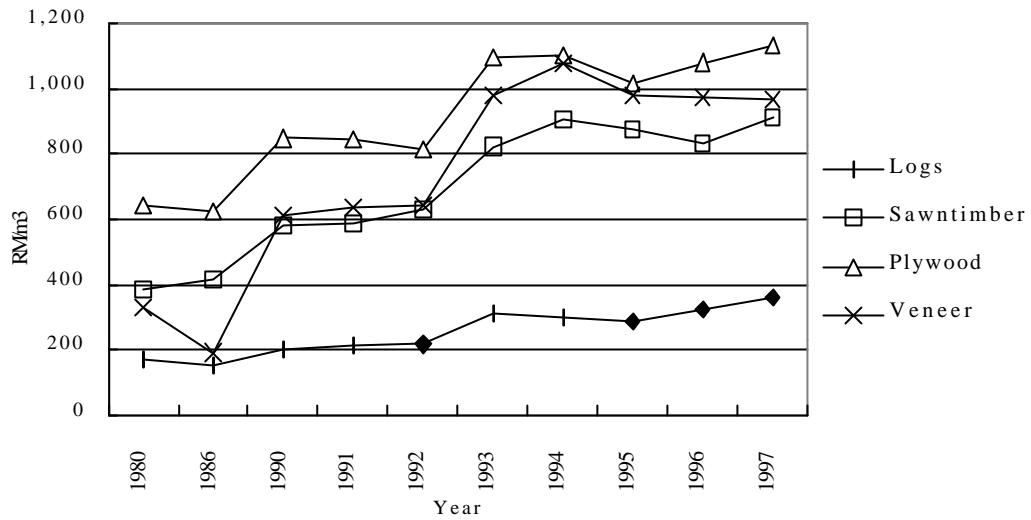


Fig. 8 Average Export Values of Major Timber Products  
Source: MTIB

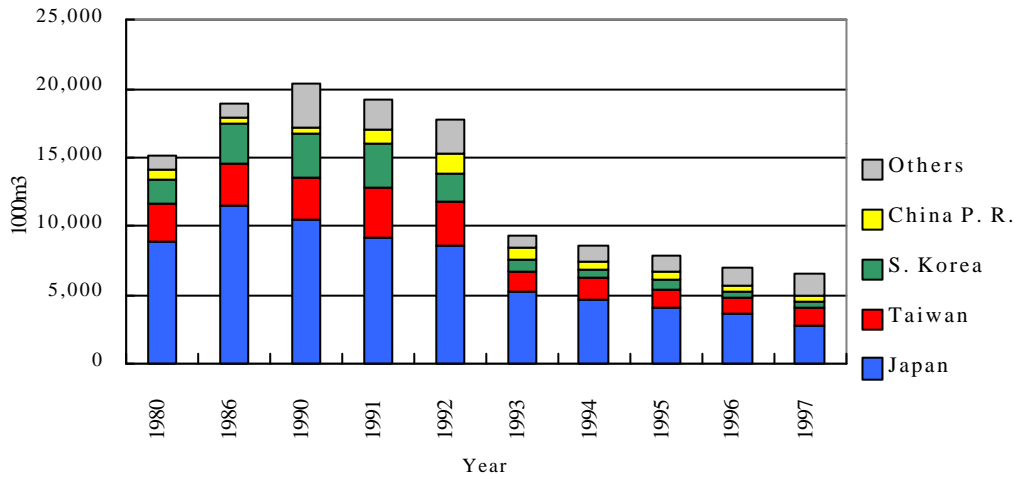


Fig. 9 Malaysia's Log Export Volume by Destination  
Source: MIIB

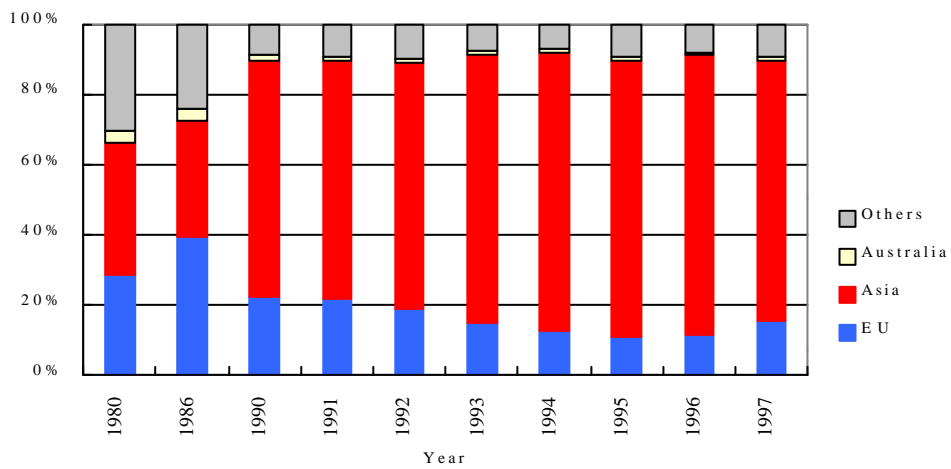


Fig. 10 Share of Sawntimber Export Volume by Destination  
Source: MTIB

have gone down together in a ratio of about 10% since 1993.

Meanwhile, the share of plywood export has gone up more than 10% per year in the 1990s. It shows they have vigorously developed the plywood industry, especially in Sarawak.

The export value of furniture has grown into a major earning industry of the wood based sector in recent year. The export value of furniture has grown notably like that: 27.5 RM million in 1986, 478.8 RM million in 1991 and 2,169.5 RM million in 1996. Furniture factories can use plentiful rubber wood as furniture material, which is reasonable price up to the recent years. Malaysia has 1.4 million ha (180 – 220 m<sup>3</sup> / ha) of rubber wood plantation, which are mostly located in Peninsular Malaysia. The rotation age of rubber wood is generally 25 years.

Malaysia's export earnings of timber products have changed drastically between 1990 and 1997 as stated above (Fig 7). Export earnings from plywood and furniture have gone up remarkably in this period. The plywood industry of Malaysia attracts the largest earnings in the timber-exporting sector today. On the other hand, export earnings of logs and sawntimber have diminished on a large scale in recent years. The export earnings of logs dropped by more than 60%. Considering promotion policies to wood processing industry and their insufficient forest resources, the current state must continue in the near future.

Among the average export values of major timber products, their trends have been increasing in the 1990s except for two years as shown in Fig. 8. There were two years when the values reduced, in 1992 and in 1995. Japan's housing market fell into a state of depression in 1995. The average export value of plywood is higher than other wood products. It is one reason for promotion measures for the plywood industry in Malaysia.

As shown in Fig. 9, Japan is the largest importer of Malaysian logs, followed by Taiwan and Korea. Malaysia exports most of its high quality logs to Japan. India imported unexpectedly 0.68 million m<sup>3</sup> of Malaysian logs in 1997.

As shown in Fig. 10, Malaysia has exported the greatest portion of its sawntimber to Asia in the 1990s. The main importers are Thailand, Japan, Singapore, Korea and Taiwan. Thailand has been the biggest importer of Malaysian sawntimber in this period. However, Malaysia's exports to Korea and Taiwan have decreasing gradually since 1993. Netherlands has imported approximately half volume of logs for EU. Malaysia maintains close ties with Netherlands from the point of view of timber trade as well.

Malaysia has exported the majority of its plywood to Asia as shown in the Fig. 11. Asian import volume of the plywood has increased rapidly as follows: 0.27 million m<sup>3</sup> in 1980, 0.65 million m<sup>3</sup> in 1990, 1.95 million m<sup>3</sup> in 1993 and 3.34 million m<sup>3</sup> in 1997. Japan, which imported 1.43 million m<sup>3</sup> (37% of total export) of Malaysian plywood in 1997, is the largest importer in the world, followed by China, Hong Kong, Singapore and Korea. Japan has rapidly increased the import of Malaysian plywood since 1993, when Sabah put its log export ban into effect and Sarawak made log export

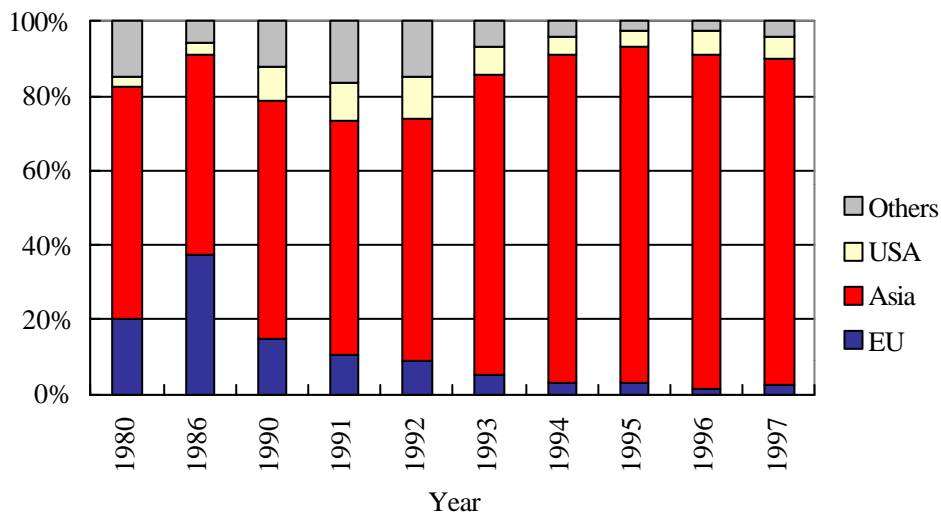


Fig. 11 Share of Plywood Export Volume by Destination

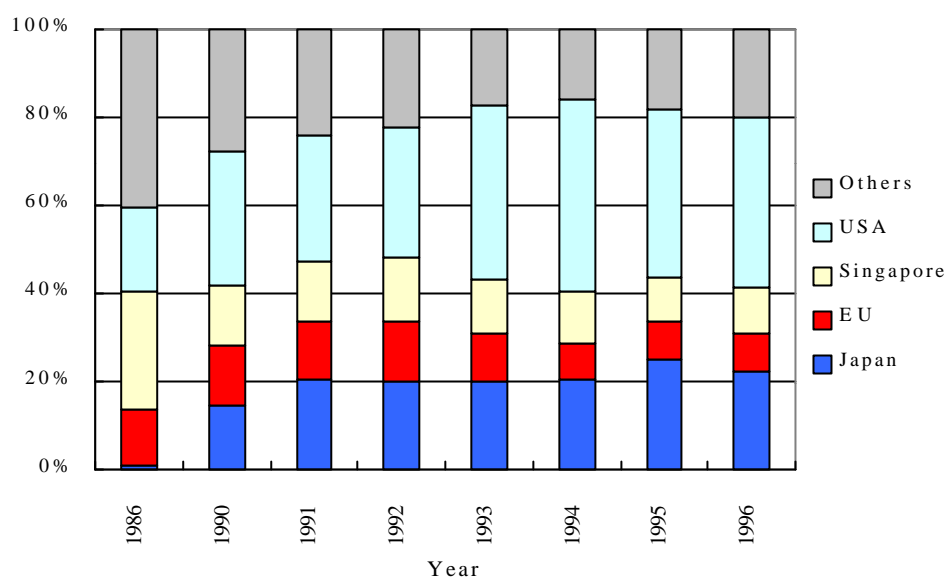


Fig. 12 Share of Export Value by Destination

Source: MTIB

quota stronger. Korea, Taiwan and China started to import Malaysian plywood in 1990.

The share of export value by destination is shown in Fig. 12. The USA is the largest importer of Malaysian furniture, followed by Japan and Singapore. Of 2,170 RM billion of furniture export value, 39% were exported to the USA and 22% were exported to Japan.

### 3-4. Cost of Forestry and Timber Sector

A typical structure of production costs and earnings for a sawmill of rubber wood, which is located in Kluang, Johore, is shown in Table. 3. This mill is a mobile sawmill whose production capacity is 200 m<sup>3</sup> / month.

The average production cost accounted for 81 % of the average price, that is, net earning is 19 %. The cost of rubber logs based on average quality, which is the largest cost item of the mill, amounts to 62 %.

The average cost of plywood mills in Sabah is summarized in Table 4. Sabah Timber Industry Association obtained this information by means of questionnaires. The cost of logs as a raw material amount to 56% of the grand total, following glue cost of 7.8% and labor cost of 6.8%. This means that plywood mills are affected heavily by the log cost. As compared with Japanese plywood mills, the labor cost is much lower.

**Table 3. Typical of Production Activity for Rubber Wood Sawntimber**

Cost Items	RM / m <sup>3</sup>
Rubber logs	165
Fuel and lubricants	16
Maintenance and repairs	16
Sawing	50
Salary	15
Depreciation	3
<b>Average production Cost</b>	<b>265</b>
<b>Average price</b>	<b>327</b>
(non-pressure treatment & non-kiln drying)	
<b>Net earning</b>	<b>62</b>

Source: MTC (1994) Draft of Final Report: *Supply and Availability of Rubber Wood*

**Table 4 Cost of Plywood Mills in Sabah**

1. Log Cost	604.38	RM / m <sup>3</sup>
2. Processing Cost		
Mill Cost	52.02	
Bundling, Stacking, Loading, Grading	17.28	
Administration, Office Maintenance & Factory Charge	27.65	
Plants & Equipments Maintenance	20.71	
Fuel & Oil	19.89	
Glue Cost	83.21	
Factory Depreciation (Buildings, Machines)	46.42	
Bank Loans, Interest, L/C Charges	13.05	
Insurance Premium	3.90	
Packing, Binding, Material etc.	24.61	
Labour	72.34	
Electricity Charges (If using SEB Power Supply)	20.31	
sub-total	401.39	
3. Marketing Cost	1.92	
4. Transportation Cost	13.33	
5. Warehousing/Shipping/Export Cost	51.11	
6. GRAND TOTAL	1072.13	

Source: Sabah Timber Industry Association

**Table 5 Recovery Rates of Plywood Mill in Sabah**

Year	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
%	54	54	52	53	53	52	52	50	47	47	48	48	48

Source: Sabah Forestry Department

**Table 6 Timber-related revenue of Sabah and Sarawak**

	Sabah (1,000RM)	(%)	Sarawak (1,000RM)	(%)
1975	151,668	57	16,000	8
1980	1,098,548	71	71,000	18
1985	530,776	46	199,000	21
1986	552,712	50	216,000	21
1987	1,000,649	71	310,000	28
1988	1,080,638	53	325,000	30
1989	912,240	52	629,000	50
1990	818,075	51	703,000	48
1991	699,815	47	666,000	40
1992	856,541	43	681,000	39
1993	702,805	53	703,000	39
1994	686,739	31	842,000	44
1995	602,929	41	1,024,000	52
1996	577,594	38	1,032,000	51

Source: Forest Department Annual Report, Sabah

Annual Report in the Forest Department, Sarawak

It is difficult to obtain data of recovery rates of wood based industries in Southeast Asian countries, because most of the countries did not make an investigation into wood based industries. As can be seen in the trend of plywood mills in Sabah, the average recovery rates have decreased gradually in this period. A recovery rate of plywood industry in Sarawak is regarded as approximately 50 %, based upon an interview with some plywood mills in Sarawak.

### 3-5. Timber-related Revenue

Timber-related revenues of Sabah and Sarawak are shown in Table 6.

There are two peaks of Sabah's timber-related revenue, in 1980 and again in 1987 to 1988. In both periods, State governmental revenue depended upon the timber-related revenue at 71%. Since the second peak, the timber-related revenue of Sabah shows a tendency of reduction: from RM 817 million in 1990 to RM 577 million in 1996.

Sarawak governmental revenue has increased for the last two decades, especially in 1989, 1994 and 1995, as shown in Table 6. In 1989 the international log prices had gone up owing to the environmental movements in the USA and Sabah's log export restriction, while the log export restriction policies of Sabah and Sarawak had a strong influence on the timber-related revenue through export log prices in 1994 and 1995.

## 4. ECONOMIC STUDY FOR MALAYSIA'S TIMBER EXPORTS: A CASE SABAH STATE

### 4-1. Theoretical Framework

Three regions of Malaysia have their own structures of forest-related industries and wood trades as stated above. This means that it is exceedingly difficult to make a scale model for the whole of the Malaysian timber trade. Accordingly, there is not any one model for Malaysian wood sector.

This paper attempts a trial model for Sabah's timber export to reveal its structure. It is an econometric model framework for its timber exports, including both exports of raw logs and plywood.

The hypothetical function of log exports of Sabah is given in equation (1). The suppliers consist of forest owners, concessionaires, contractors and log traders. The forest owner in the State is the State Government. Therefore, log production is carried out basically under the timber royalty system of the State. In the royalty system, concessionaires or contractors must harvest timber according to the logging rules within a given period of time, getting a license of timber-harvesting under the forest management plan of the government (Repetto and Gillis, 1989 and Tachibana et al., 1996).

They decide whether they export logs ( $Q_{RS}$ ) or not, considering export log prices and domestic log prices. It, however, turned out to be enough to use the log export price ( $P_R$ ) only, because their export logs are higher quality than domestically supply logs. In a word, the domestic log price seems irrelevant to the log export. Besides it is difficult to get their domestic log price.

Generally, some cost elements of their production and transportation are taken up for supply function. Unfortunately, enough time-series data were not available to estimate the function. The suppliers will promote log exports with increases in timber harvest (TH). In addition, the timber-related revenue must have a significant influence on timber export behavior of Sabah, owing to the role to Sabah State revenue.

Three dummy variables (DM85, DM89, DM93) are included to capture structural influences of the measures to timber exports and timber-processing industries. DM85 was used as a substitute for structural changes from Indonesian log export ban from 1985. DM89 substitutes for structural transition to timber-processing industries under Sabah's promotion measure since 1989. DM93 is taken as a substitute for structural changes caused by Sabah's log export ban since 1993.

The signs under the variables in equation (1) and the following equation show their direction of effects on the independent variables.

$$Q_{RS} = f(P_R, STR, TH, DM85, DM89, DM93) \quad \text{-----(1)}$$

$\begin{matrix} + & +/- & + & + & - & - \end{matrix}$

Hypothetical function of wood products such as plywood and sawntimber is given in equation (2). The model structure is similar to equation (1) except for signs of dummy variables.

$$Q_{PLWS} = f(P_{PLW}, STR, TH, DM85, DM89, DM93) \quad \text{-----}(2)$$

+    +/-    +    -    +    +

Generally speaking, hypothetical demand function for imported timber in foreign countries such as Japan and Korea is given as equation (3). Consumers decide timber demand level facing the price ( $P_T$ ) and other price set ( $P_S$ ). Besides the prices, economic activities such as Gross Domestic Products and housing construction starts have a great influence, probably positive impacts, on timber demand.

$$Q_D = f(P_T, P_S, GDP / HS) \quad \text{-----}(3)$$

-    +    +

#### 4-2.Methods and Data

In order to mitigate the simultaneous equation bias, two stage least squares (2SLS) and generalized least squares (GLS) are regularly adopted as a estimation method to demand and supply functions (Johnston, 1991). Sabah, however, can be hypothesized as a small country on international timber markets. The timber export of Sabah cannot have an impact upon the international price. Consequently, estimation has been done for the timber supply functions of logs and plywood utilizing ordinary least squares (OLS) on TSP 4.4 for Windows 95 in this study. These equations are specified in the logarithmic linear in both sides. The annual data set for the estimation is available for the period 1970 to 1997.

#### 4-3.Estimation Results and Discussion

The following estimation results indicate that this has successfully modeled the structure of timber exports of Sabah.

The numbers in the parenthesis under the estimated coefficients indicate t-statistics of the coefficient. Superscripts \*\* indicates significance at 1% level and \* at 5% level. The  $R^2$  estimated is the coefficient of determination and is used measure of the goodness of fit of a regression line. In other words, it measures the percentage of the total variation in  $Q_{RS}$  and  $Q_{LWS}$  explained by the regression model. The DW is Durbin-Watson d statistics, which indicates the estimated residuals.

The following estimation result [1] shows the log export structure of Sabah. The coefficient of  $P_R$  means the price elasticity of export supply, indicating that the 10% rise in the export price makes 14% increase of log export from Sabah. The coefficients of timber-related revenue and timber harvest are significant at the 5% level with the expected signs. It means that timber harvest (log production) has a great impact upon the log export. The 10% decrease of timber harvest in Sabah drops probably by 45% of its log exports. Besides, Sabah certainly adds to its log export as timber-related revenue decreases, owing to the financial dependence upon the revenue. DM89t was set at a time trend caused by its promotion measure to timber-processing industries and exhaustion of useful forest resources, putting 1 in 1989, 2 in 1990, ..., 9 in 1997. Its serious exhaustion of forest resources must decrease log exports significantly.

$$Q_{RS} = -18.238 + 1.4270 * P_R - 0.82945 * STR + 2.6933 * TH - 4.4727 * DM93 - 0.46717 * DM89t \quad \text{---}[1]$$

(-1.3478) (9.9076\*\*) (-2.5594\*) (2.6592\*) (-7.4705\*\*) (-5.8598\*\*)

$R^2 = 0.96205, DW = 2.0760$

In the estimation result [2], the coefficients of  $P_{PLW}$ , STR, DM85 and DM89 are significant with the expected signs. Of Sabah, the price elasticity of plywood export is higher than that of log export. There is some possibility of 19% increase in plywood export from Sabah as the international price of plywood goes up at the 10%. Meanwhile, the coefficient of timber-related revenue is significant with negative sign. If the ratio of timber-related revenue in its financial affairs drops at 10%, plywood exports from Sabah will be able to increase at 6%. It probably shows that its promotion measures for the plywood industry are progressing under the good financial condition. The log export ban of

Indonesia and promotion measure to processing industries of Sabah had a positive effect on the plywood export.

$$Q_{PLWS}=24.780+1.9186*P_{PLW}-0.6157*STR+1.7976*DM85+1.0915*DM89 \quad \text{---[2]}$$

(4.3570\*\*) (2.5481\*) (-1.9915) (4.6516\*\*) (2.2129\*)

$R^2=0.8780, DW=1.5161$

An econometric study for the timber demand will be discussed in the next stage within a simultaneous equation model.

## 5.CONCLUSION

Seen worldwide, the policy for forest management and timber trade has drastically changed over the last decade. Malaysia has taken a sustainable forest management strategy upon forest and timber trade policy as well, making its own criteria and indicators for sustainable forest management. From this point of view, we must pay adequate attention to forest and timber certification systems.

Furthermore, the Malaysian government has been encouraging wood processing industries in its Industrial Master Plans, utilizing rubber wood as a furniture material in Peninsular Malaysia and developing a big timber processing zone in Sarawak. Discussion is needed of the validity of forest resources usage, considering a scarcity of forest resources, and contribution to regional economy.

Meanwhile, forest resources in Sabah have been decreasing remarkably for the last two decades. In addition, those of Sarawak have reduced gradually in recent years. In the future, the author believes that there is some possibility of importing raw logs into both States from New Zealand and other countries. Further detailed investigations are needed regarding major timber exporters and importers.

## ACKNOWLEDGEMENTS

Special thanks are due to Mr. Cheah Kam Huan (Malaysian Timber Council), Mr. Anduru Abis (Forestry Department of Sabah), Datuk Junior Pang (Timber Association of Sabah), Ms. Dayang Nena BT. Abang Bruce (Sarawak Timber Industry Development Corporation), Mr. Kunio NAKAO (Karimoku (M) SDN. BHD), Mr. M. AMANO (Marubeni) for helpful suggestions to this research.

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