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April 17, 1990

United Nations Industrial
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Attention: Mr. S. Morozov
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Gentlemen:

Re: Project No. DP/RAS/85/010
Contract No. 89/132/SM
Assistance to COIME in Project
Identification and Formulation
of Opportunity Studies

We are pleased to submit our final report on the Market Study on Melamine Resin in the ASEAN Region. This study on the market for melamine resin was initially one of the four opportunity studies identified by the Committee on Industry, Minerals and Energy (COIME) and commissioned by the UNIDO for possible inclusion in the ASEAN Industrial Joint Ventures (AIJV) program.

In consideration of the information needs of a prospective Indonesian project proponent and with the tacit approval of the UNIDO, the nature of the study on melamine resin has been revised from an opportunity study to a full market study.

This study is aimed at providing potential AIJV promoters and investors with market information on melamine resin to ascertain the market potential of the product in the ASEAN region.

This study covered the following ASEAN countries: Indonesia, Malaysia, the Philippines and Thailand.

The market analysis focused on the following aspects:

- o Magnitude of imports and exports of the product among countries in the region;
- o Major end-user industries and indications of growth;
- o Major suppliers of melamine resin in each covered country and their market shares;
- o Import duties and prevailing market prices of melamine resin.

The market data used in this report consisted mainly of primary information generated through interviews with the user industries in the ASEAN countries. Secondary information from government and trade publications were also used to supplement the primary information gathered. SGV & Company's offices in the other ASEAN countries provided assistance in the data gathering process.

We will be glad to discuss any questions you may have on this report.

Very truly yours,

SGV & Co.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Austria

**MARKET STUDY ON MELAMINE RESIN
IN THE ASEAN REGION**

April 1990

FINAL REPORT

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1. EXECUTIVE SUMMARY

1.1 MARKET SIZE AND INDUSTRY USERS

The estimated 1989 ASEAN market (excluding Brunei Darussalam and Singapore) for melamine resin is 23,360 metric tons as shown below. About 84 per cent of this is utilized by plywood manufacturers in Indonesia as glue in the form of melamine formaldehyde. About 13 per cent of adhesives used by plywood manufacturers is melamine formaldehyde, 20 per cent is phenol formaldehyde and the balance is urea formaldehyde.

The use of melamine formaldehyde as plywood glue is specified by the buyer or importer. According to PT Kayu Lapis Indonesia, a leading plywood manufacturing company, 80 per cent of its plywood exports to Japan utilized melamine formaldehyde.

Historical data indicate that Japan is a growing market for Indonesian plywood. The relative share of exports to Japan has been increasing from five per cent in 1984 to thirty per cent in 1988. An average of 86 per cent of domestic plywood production has been exported from 1984 to 1988.

INDUSTRY USER	INDONESIA	MALAYSIA	PHILIPPINES	THAILAND	TOTAL
Dinnerware	---	380	360	1,480	2,220
Textile	---	220	600	---	880
Lamination	---	260	---	---	260
Paints and Coatings	---	190	10	10	210
Wood	19,800*	190	---	---	19,790
TOTAL	19,800*	1,300	970	1,490	23,360

* Association of Industrial Formalin and Thermosetting Adhesive's (AIFTA's) estimated volume for 1990.

Source: Interviews.

The second biggest industry user of melamine resin in the ASEAN region is the melamine dinnerware industry. The dinnerware manufacturers use melamine resin in the form of melamine molding compound which has 40 per cent component of melamine resin. In 1989, Malaysia, the Philippines and Thailand are noted to have an aggregate usage of 5,550 metric tons of melamine molding compound equivalent to 2,220 metric tons of melamine resin.

Thailand accounted for about six per cent of total ASEAN market in 1989. It imports melamine resin for the manufacture of dinnerware.

Malaysia, which consumed about 1,300 metric tons of melamine resin had a variety of industry users for the amino resin. Melamine molding compound solution was used by dinnerware makers (29 per cent of total), melamine formaldehyde was consumed by textile millers (21 per cent), lamination sheet manufacturer (20 per cent), paints and coatings formulators (15 per cent), and plywood and blockboard processors (15 per cent).

The Philippines consumed about 970 metric tons of melamine resin in 1989. About 600 metric tons was used by textile millers, while the balance was consumed by melamine dinnerware manufacturers as melamine molding compound, and paints manufacturers as melamine formaldehyde.

1.2 SOURCES OF SUPPLY

The requirements for melamine resin by the ASEAN countries are totally satisfied by importations.

There are four major country suppliers of melamine resin in the ASEAN region including Japan, Taiwan, Italy and the United States. Saudi Arabia was also indicated as a source of melamine resin to Indonesia.

There is a plan to put up a melamine resin plant in Indonesia with a capacity of 30,000 metric tons per year. This would adequately supply requirements of the ASEAN region in the early 1990s. Aside from this, a phenol plant will be set up in Lhok Sumawe, Aceh. According to the Association of Industrial Formalin and Thermosetting Adhesive (AIFTA) and Ministry of Industry of Indonesia, the plant will have an annual capacity of 40,000 metric tons of phenol and 24,000 metric tons of acetone. Registered as PT Phenol Swadaya, Inc., it will be an AIJV project with 70 per cent equity by Indonesian proponents, and 10 per cent each from investors in Brunei Darussalam, the Philippines and Singapore.

1.3 PROJECTED DEMAND

The demand for melamine resin in the next 10 years by the ASEAN market is projected in three scenarios presented below.

SCENARIO A (20% Annual Growth Rate in the Demand for Melamine Resin in Indonesia)

Year	Indonesia	Malaysia	Philippines	Thailand	TOTAL
1990	19,600	1,360	1,050	1,640	23,650
1995	51,800	1,720	1,600	2,640	57,760
2000	128,200	2,150	2,450	4,250	137,050

SCENARIO B (15% Annual Growth Rate in the Demand for Melamine Resin in Indonesia)

Year	Indonesia	Malaysia	Philippines	Thailand	TOTAL
1990	19,600	1,360	1,050	1,640	23,650
1995	39,000	1,720	1,600	2,640	44,960
2000	78,300	2,150	2,450	4,250	87,150

SCENARIO C (10% Annual Growth Rate in the Demand for Melamine Resin in Indonesia)

Year	Indonesia	Malaysia	Philippines	Thailand	TOTAL
1990	19,600	1,360	1,050	1,640	23,650
1995	32,900	1,720	1,600	2,640	38,360
2000	53,800	2,150	2,450	4,250	62,650

Note: In metric tons.

Source: Interviews.

A 20 per cent yearly growth rate from 1990 to 2000 is assumed in Scenario A, based on the expected annual 20 per cent growth rate of the Indonesian plywood industry, the main target market for melamine. Scenario A projects demand for melamine resin to be about 57,000 metric tons by 1995, to reach 137,050 metric tons by the year 2000.

More conservative projections are presented in Scenarios B and C which assume a 15 per cent and 10 per cent annual growth rate in demand, respectively, by the Indonesian plywood industry in the next decade.

It is interesting to note that in all three scenarios, projected demand for melamine resin would be exceeding the annual 30,000 metric tons capacity of the proposed melamine plant in Indonesia by the year 1995. On the other hand, the proposed 30,000 metric tons capacity of the plant appears suitable considering current requirement. It is thus proposed that the possibility of expansion or of establishing a second plant should be reviewed some time after the start up of the operation of the 30,000 metric tons per year capacity plant.

1.4 DISTRIBUTION CHANNELS AND PRICES

In the ASEAN countries covered by the study, melamine resin is imported directly or purchased through traders by melamine dinnerware manufacturers and melamine formaldehyde factories. Melamine formaldehyde is generally purchased locally from manufacturers; a small amount is imported.

The bulk of melamine importations by the ASEAN countries is procured from Japan and Taiwan at prices ranging from US\$1,200 to US\$2,000 per metric ton. The prices of melamine-based products and substitutes, namely, urea, urea formaldehyde and phenol formaldehyde, are presented below.

	INDONESIA	MALAYSIA	PHILIPPINES	THAILAND
Melamine Resin	1,350-1,400	2,000	1,700-1,800	1,200-1,900
Urea	120	n.a.	1,300-1,400	n.a.
Melamine Formaldehyde	n.a.	1,400	n.a.	1,400-2,200
Urea Formaldehyde	n.a.	200-1,000	n.a.	n.a.
Phenol Formaldehyde	840-870	1,100-1,500	n.a.	n.a.

n.a. - Not Available.

Source: Interviews.

1.5 TARIFF AND DUTIES

Aside from the conventional tariff and customs duties, there are no regulations pertaining specifically to the trade of melamine resins. Import duties range from two to 40 per cent as shown below.

Country	Import Duty (%)	Value-Added Tax (%)
Indonesia	5	10
Malaysia	2	-
Philippines	10	-
Thailand	40 30*	-

* Reduced import tariff for melamine resin imported for use in the manufacture of coloring materials.

1.6 ASSESSMENT OF MARKET POTENTIAL

The ASEAN market for melamine resin can be evaluated on the following criteria: current and potential size of the market, rate of market penetration, supply considerations, price orientation, and regulatory aspects.

1.6.1 Market Size and Projected Penetration Rate

Currently, the size of the market for melamine resin in the ASEAN region is not very large but growing fast, quantified to be about 23,360 metric tons, and largely concentrated in Indonesia (84 per cent of total melamine resin consumption in the region).

The melamine resin market in Indonesia is a niche market. Melamine resin, in the form of melamine formaldehyde, is sold to plywood manufacturers. Their usage of melamine formaldehyde as plywood adhesive is dependent on the specifications of foreign buyers, particularly those from Japan. Currently, about 13 per cent of total adhesive usage of the plywood industry in Indonesia is accounted for by melamine formaldehyde, 20 per cent by phenol formaldehyde, and the balance by urea formaldehyde.

Historically, production and export of Indonesian plywood had been growing at a fast rate of 21 per cent and 23 per cent per year, respectively, from 1984 to 1988. The corresponding demand for melamine resin, on the other hand, is more conservatively estimated at 10 per cent to 20 per cent annual growth rates, as shown earlier.

Expansion of foreign demand for plywood is expected to continue as foreign markets turn to Indonesia from the Philippines and Malaysia whose wood resources are becoming more limited. The relative share of export of Indonesian plywood to Japan, for instance, has grown from only five per cent in 1984 to 30 per cent in 1988.

It has been established that Indonesia could support continued plywood production at high levels for a long time. According to the World Resources Institute, the country's forest area is 114 million hectares. Present harvest rate is 600,000 hectares per year.

The installation of the melamine project in Indonesia would allow for a more competitive pricing strategy for melamine with the elimination of the import duty and other percentage mark-ups on its selling price. From the prevailing price of US\$1,350 to US\$1,400 per metric ton of melamine resin in Indonesia, market prices of melamine resin could be reduced by as much as 14 per cent to US\$1,155 to US\$1,200 per metric ton. As the market is relatively price-sensitive, this could enable the project to quickly capture the market for melamine resin not only in Indonesia but in other ASEAN countries as well.

To quickly penetrate the Indonesian market for melamine resin, it is recommended that focus be made on the 16 groups of Indonesian plywood manufacturers which would likely have their own plywood adhesive processing companies.

If a long-term distribution arrangement with these groups of plywood manufacturing companies could be arranged, the project could realize an estimated penetration rate of over 50 per cent of the Indonesian market as shown below. Assuming a 56 per cent penetration ratio of the Indonesian market alone and an annual growth rate of 15 per cent, the project could potentially sell about 20,000 metric tons by 1995, and an estimated 40,000 metric tons by the year 2000.

Plywood Manufacturing Group	Aggregate Production Capacities*	Percent to Total (%)
Alas Kusuma Group	286,140	3
Barito Pacific Timber Group	673,847	7
Bumi Raya Utama Group	235,677	3
Djajanti Timber Group	573,951	6
Harapan Kita Utama Group	470,295	5
Hendratna Group	57,915	1
Hutan Raya Indonesia Group	293,869	3
Jati Maluku Timber Group	200,038	2
Kalamur Group	161,801	2
Kalimans Group	247,209	3
Kayu Lapis Group	334,620	4
Korindo Group	506,882	6
Satya Djaja Raya Group	247,241	3
Sumber Mas Group	255,811	3
Surya Dumai Group	307,809	3
Tanjung Raya Plywood	200,038	2
Total Capacities of Plywood Manufacturing Groups	5,052,943	56
Other Plywood Manufacturing Companies	4,009,100	44
Total Capacities of Plywood Manufacturing Companies	9,062,043	100

* In cubic meters.

Source: 1988 Directory, Association of Industrial Formalin and Thermosetting Adhesive.

In the long run, marketing efforts could be channeled to the untapped individual plywood manufacturing companies in Indonesia which, together, have an aggregated annual capacity of 4,009,100 cubic meters. The user companies in the other ASEAN countries can also be tapped for possible distribution arrangements.

1.6.2 Supply Considerations

Currently, supply of melamine resin in ASEAN countries all come from importations. There is, however, an Indonesian urea fertilizer company which is seriously considering the setting up of a melamine resin plant with a capacity of 30,000 metric tons a year.

Aside from the melamine resin plant, the production of basic raw material for phenol formaldehyde is also being planned in Indonesia. Production of phenol would be about 40,000 metric tons per year. While phenol formaldehyde is a possible substitute for melamine formaldehyde, the establishment of the phenol plant is not seen as a serious threat to the viability of the prospective melamine resin plant. Because of the relatively higher quality of melamine formaldehyde over phenol formaldehyde, the latter could eat up into the lower end of the market, currently dominated by urea formaldehyde.

1.6.3 Price Orientation

It is expected that melamine resin could be competitively produced and sold if the melamine plant is set adjunct to a natural gas field and/or an ammonia-urea plant. With the ready availability of urea, the main raw material in the production of melamine resin, production cost can be greatly reduced. Moreover, with the elimination or reduction of import duties and other tariffs, melamine prices in the ASEAN region, notably in Indonesia, could be significantly reduced.

1.6.4 Regulatory Aspects

There does not seem to be any impediment to the establishment of a melamine resin plant in Indonesia and to the trade of melamine products within the ASEAN region except for the tariff barriers. In fact, in Indonesia, the setting up of the plant as an AIJV project is being supported by the Ministry of Industry.

An AIJV project is participated in by nationals of at least two ASEAN countries with a minimum equity contribution of five per cent each from nationals of said participating country.

If the plant is proposed as an AIJV project, it will enjoy a minimum margin of tariff preference of 90 per cent for the product in each of the participating ASEAN countries; its melamine resin product is likewise entitled to exclusivity privileges for three years, wherein no additional production capacity is allowed to be established within the participating ASEAN countries for similar products unless 75 per cent of such additional production capacity is for export outside the ASEAN region.

1.6.5 Conclusion

The ASEAN market for melamine resin appears to be attractive, specially if medium term arrangements can be made to supply the requirements of the Indonesian adhesives and plywood plants. This is the crucial market that has to be penetrated.

The market is experiencing robust growth that could continue expanding throughout the decade.

The company in the best position to take advantage of tapping this market is an Indonesian ammonia-urea plant. This company could ensure the cheap supply of urea, the basic raw material in the manufacture of melamine resin. The price of its output would very likely be competitive vis-a-vis imports. The company could likewise easily arrange to sell to local adhesives manufacturers.

2. INTRODUCTION

2.1 PROJECT BACKGROUND

This study on the market for melamine resin was initially one of the four opportunity studies identified by the Committee on Industry, Minerals and Energy (COIME) for prospective implementation in Indonesia and the Philippines. COIME, with assistance from UNIDO, identified these projects (including that on melamine) for possible inclusion in the ASEAN Industrial Joint Ventures (AIJV) program. This program works towards increased and meaningful industrial and economic cooperation among countries within ASEAN region with the private sector as the prime mover.

In consideration of the information needs of a prospective Indonesian project proponent and with the tacit approval of the UNIDO, the nature of the study on melamine has been revised from an opportunity study to a full market study. The proponents have apparently undertaken an opportunity study and evaluated commercial profitability and technical requirements. They plan to put up a 30,000 metric ton per year melamine resin plant in Aceh, Indonesia, beside their urea fertilizer plant.

2.2 OBJECTIVES OF THE STUDY

This study is aimed at providing potential AIJV promoters and investors with market information on melamine to ascertain the market potential of the product in the ASEAN region.

2.3 SCOPE OF THE STUDY

The study covers both the demand and the supply aspects of melamine in the ASEAN region, notably, Indonesia, Malaysia, the Philippines and Thailand. Per terms of reference, the study excludes Brunei Darussalam and Singapore. The market analysis focuses on the following aspects:

- o Magnitude of imports and exports of the product among countries in the region;
- o Major end-user industries and indications of growth;
- o Major suppliers of melamine in each covered country and their market shares;

- o Import duties and prevailing market prices of melamine.

In addition, a description of the product and its common applications is included in the study.

2.4 METHODOLOGY

Data for the study were derived through primary and secondary sources. Primary data were obtained through interviews with importers and users of melamine. Secondary data were obtained using the trade statistics of each ASEAN member-country, and other government and industry publications.

2.5 PRODUCT PROFILE

2.5.1 Product Description

Melamine is a versatile chemical used as an input for the preparation of industrial materials. Chemically, melamine is known as 2,4,6,-Triamino-1,3,5-triazine and is derived commercially through relatively simple chemistry by heating urea. Physically, it is a fine, white crystalline powder that melts at approximately 350°C with vaporization.

One of its most outstanding characteristics is its relative insolubility in most organic and inert solvents and its versatile reactivity with a wide variety of other chemical intermediates such as acid anhydrides, halogens, and alkyl and aryl halides, among others.

Being a weak base, it forms a series of well-defined salts. It is an essential starting point for melamine formaldehyde resins, one of the more important amino resins, and is used in the manufacture of a broad range of industrial materials and household products.

2.5.2 Applications

Melamine finds a broad range of application in diverse fields especially as a material for plastics and molding compounds, coatings, and bonding agents.

As a raw material for plastics and molding compounds, melamine is largely used in the manufacture of high quality tableware, wash-resistant buttons, arc-resistant ignition housings, electrical panel boards and insulation. Melamine molded products exhibit inherent strength and hardness, excellent resistance to water, chemicals, and discoloration, and outstanding electrical insulation properties. Like urea and other amino resins, melamine compounds have no tendency to impart tastes and odors to foods, making them ideal raw material for tableware.

Melamine also finds considerable usage in the furniture industry as a laminating and surface-coating resin. It is widely used in laminated products as cabinets, dinette tops, doors, furniture panels, kitchen and bathroom countertops, and partitions for mobile homes, and commercial and public buildings. Melamine laminates and surface coatings provide good resistance to water and chemicals and is the source of increased hardness, improved color and color retention, and superior durability.

As an adhesive or bonding resin, the melamine glue is utilized in the manufacture of plywood, as it produces colorless glue lines that have excellent water resistance. The melamine adhesives exhibit excellent properties of high bond strength, heat resistance, and good stability after being spread on veneer, making it an ideal bonding resin for plywood and other related materials.

Moreover, melamine finds a considerable utility in dyeing operations, as textile treating resins, leather resins, ion-exchange resins and membranes, rubber additives, fire retardants, chemotherapeutic agents, stabilizers, explosives, sterilizing agent, antitarnish agent, and as cathode materials for primary batteries. In terms of extent of usage, in industrialized countries such as the United States, it is generally held that protective and decorative laminates account for about 45 per cent of consumption of melamine; molding compounds, about 30 per cent; textile resins, nine per cent; coatings, seven per cent; and paper-treating resins and various adhesives, nine per cent¹.

¹ Chemical and Process Technology Encyclopedia.
United States of America: Mc-Graw Hill Inc., 1974.

2.5.3 Raw Materials and By-Products

About one ton of melamine is produced from three tons of urea, its main input. By-products per metric ton of melamine are concentrated ammonium carbamate solution (in turn an input in the manufacture of urea) composed of ammonia (NH_3), carbon dioxide (CO_2), and water (H_2O).

2.5.4 Melamine Substitutes

With the diversity of uses and applications that melamine provides comes the diversity of products that function as its substitutes. These melamine substitutes are mostly thermosetting resins and petrochemical products which also find wide application in many household and industrial products.

As a raw material for plastics and as molding compounds, melamine's substitutes are a number of thermoplastics, technically known as polyethylene, polypropylene, polystyrene and polyvinyl chloride. Particularly as input for dinnerware, melamine finds suitable substitute in urea.

As a laminating and surface-coating resin for pieces of furniture, identified melamine substitutes include phenolic resins, and polyurethane.

As a bonding resin for plywood, good substitutes are urea-formaldehyde and phenol-formaldehyde.

While melamine has many substitutes, depending on specific use or application, its most important substitute is urea which, along with melamine compounds, is the most widely used amino resin. Unlike urea however, melamine is more rugged (that is, does not easily crack even if subjected to heat and cold temperature), making it more suited to outdoor exposure.

Table 1
Applications of Melamine and Substitutes

APPLICATION	Melamine	Urea	Phenolics	Poly-propylene	Poly-ethylene	Poly-styrene	Poly-urethane
Dinnerware	x	x		x	x	x	
Plywood Adhesive	x	x	x				
Furniture Laminates	x		x				x
Surface-coating Resin for Paper	x						
Textile-treating Resin	x						
Paint Additive	x						

Source: Chemical and Process Technology Encyclopedia.
United States of America: Mc-Graw Hill Inc., 1974.

3. THE INDONESIAN MARKET

3.1 MARKET SIZE AND INDUSTRY USER

The only identified industry user of melamine in Indonesia is the plywood manufacture industry. It uses melamine in the form of melamine formaldehyde, one of three major chemicals used as glue by the industry. The other two adhesives used are urea formaldehyde and phenol formaldehyde.

The Association of Industrial Formalin and Thermosetting Adhesive (AIFTA) has estimated the 1990 requirement for melamine resin at 19,600 metric tons based on usage of 78,400 metric tons of melamine formaldehyde. This is about 13 per cent of total estimated adhesive usage of the plywood industry as shown in Table 2.

About 65 to 70 per cent of adhesives used by the plywood manufacture industry is urea formaldehyde while 20 per cent is phenol formaldehyde.

An interview with PT Kayu Lapis Indonesia, a leading plywood manufacturing company, indicated that the type of plywood adhesive used is usually specified by the buyer or importer. In the case of the export of PT Kayu Lapis to Japan, 80 per cent of plywood shipped utilized melamine formaldehyde as adhesive. Melamine formaldehyde is considered to be the best quality plywood glue which evenly spreads between the veneers of the plywood. Unlike phenol formaldehyde, it does not have a pungent smell. Urea formaldehyde, the cheapest among the three types of plywood adhesives, is relatively of lower quality.

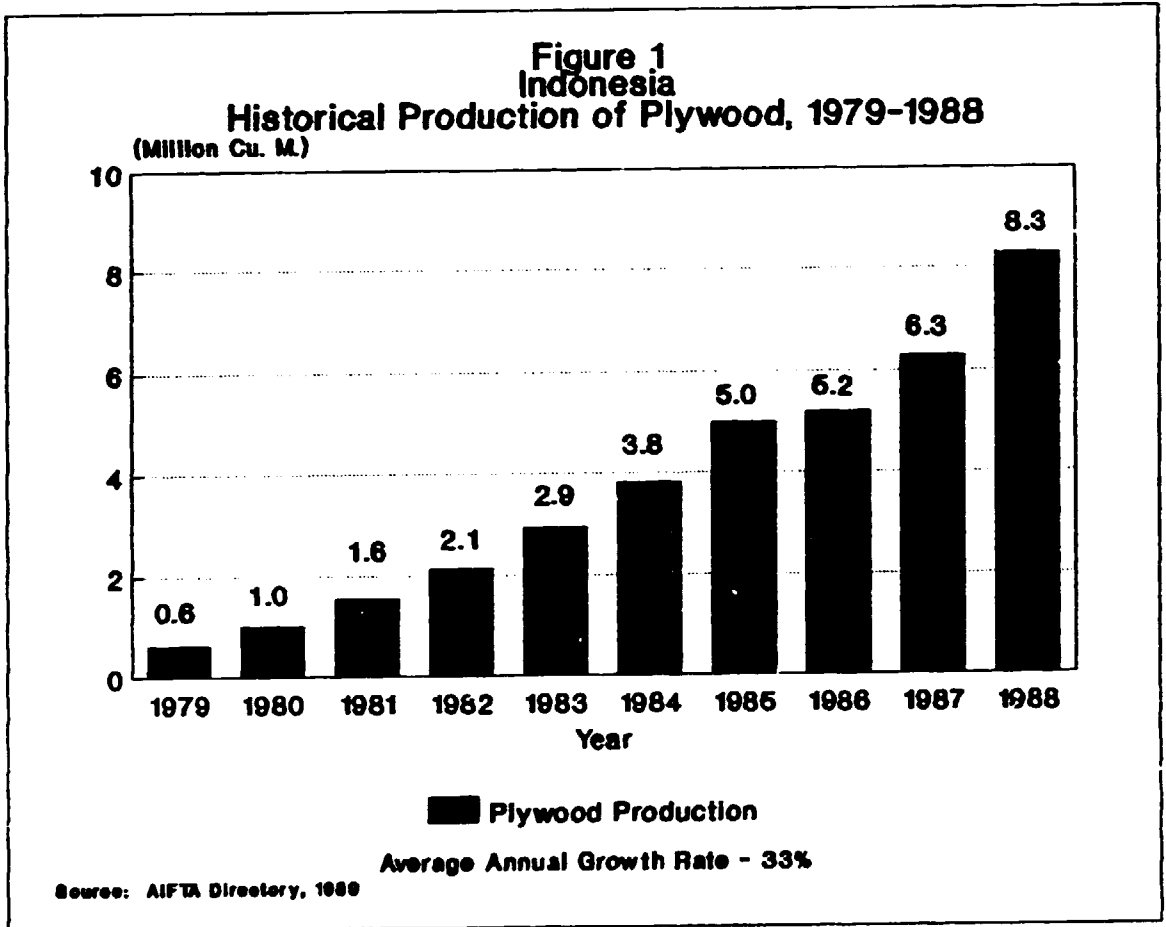
Table 2
Indonesia
Estimated Plywood Production
and Melamine Resin Usage, 1990

	Volume -----
Estimated Plywood Production (cu.m.)	8,500,000
Adhesives Needed (m.t.) (70 kgs. of adhesives needed per cu.m. of plywood*)	595,000
Melamine Formaldehyde Estimated Usage (m.t.)	78,400
Equivalent Melamine Resin (m.t.) (1 m.t. of melamine formaldehyde is equivalent to 0.25 m.t. of melamine resin)	19,600

* Factor indicated by AIFTA. This is slightly lower than factor indicated in Malaysia of 80 kgs. per cu.m. of plywood.

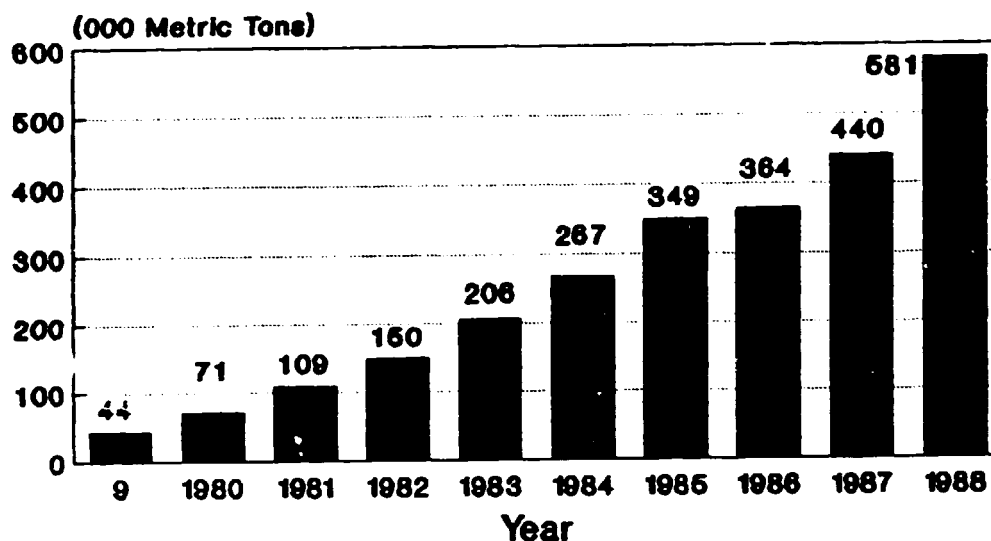
Source: Association of Industrial Formalin and Thermosetting Adhesive.

The estimated 1990 adhesives usage by the plywood manufacture industry appears conservative. This is based on indicated aggregate plywood attainable production capacity of 8.5 million cu.m. (installed capacity is 9.1 million cu.m. at two shifts per day). In 1988, as shown in Figure 1, plywood production already reached a level of 8.3 million cu.m. From 1979 to 1988, plywood production has increased at an average rate of 33 per cent per year.



Domestic consumption of plywood adhesives likewise increased at the same significant rate of 33 per cent annually from 1979 until 1988. Estimated adhesive usage by the local plywood industry in 1988 is about 581,000 metric tons (see Figure 2).

Figure 2
Indonesia
Historical Consumption of Plywood Adhesives, 1979-1988



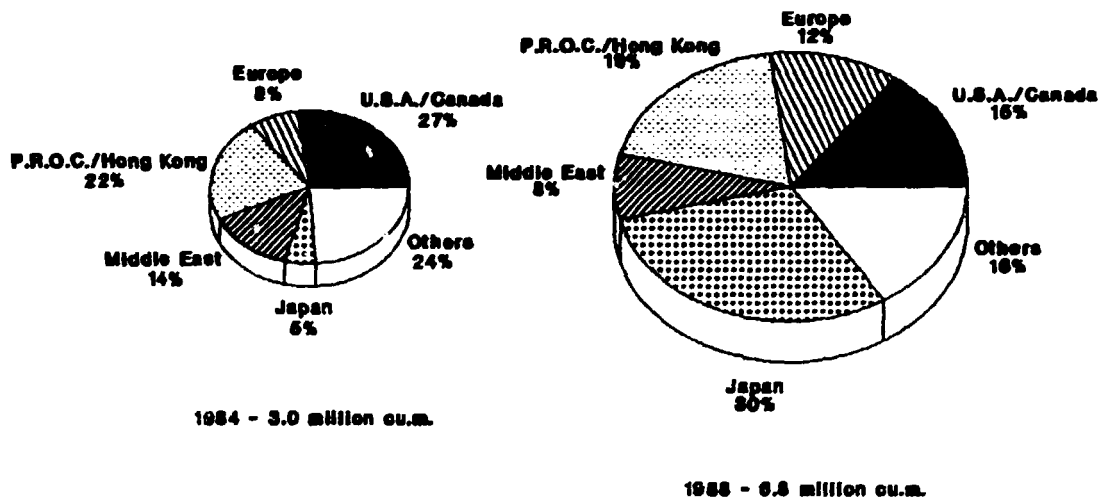
■ Plywood Adhesive Consumption

Average Annual Growth Rate - 33%

Source: AIFTA Directory, 1989.

An average of 86 per cent of plywood production has been exported during 1984 to 1988. Indonesia's major plywood export markets are Japan, China, North America and Europe. The relative share of exports to Japan has been increasing from about five per cent in 1984 to 30 per cent in 1988.

Figure 3
Indonesia
Exports of Plywood
by Country Market, 1984 and 1988



Source: Indonesian Wood Panel Association (IWWA/APKINDO).

There are a total of 131 plywood and particle board manufacturing plants spread throughout Indonesia in 1988. Sixty four mills are located in the island of Kalimantan, 33 in Sumatra, 20 in Java, 12 in Maluku and two in Sulawesi (see Appendix for list of mills and location).

At least 24 adhesive factories service the glue requirements of the plywood mills. Most of these are sister companies of the mills, and are part of business groups with wood processing companies. The list of adhesives manufacturers is shown in Table 3. They produce the various types of glues required by plywood manufacturers, i.e., urea formaldehyde, phenol formaldehyde and melamine formaldehyde.

Table 3
Indonesia
Installed Capacities
of the Adhesive Manufacturing Companies, 1988

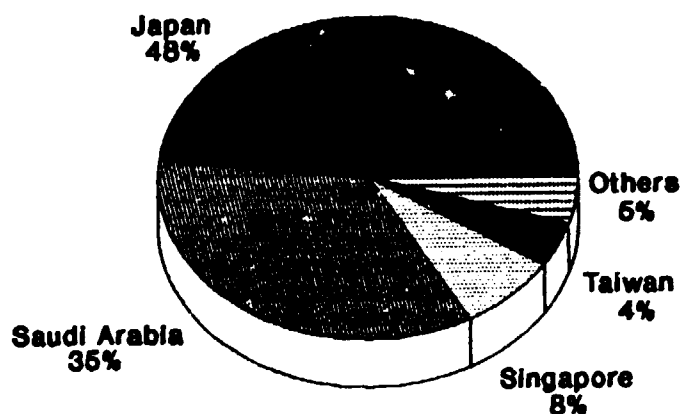
Location	Name of Company	Installed Capacity (MT/Yr.)
Sumatra	PT Superin	48,000
	PT Dyno Mugi Indonesia	42,000
	PT Sabak Indah	36,000
	PT Korindo Abadi	22,000
	PT Uforin Prajen Adhesive Ind	60,000
	PT Susel Prima Permai	49,000
Java	PT Arjuna Utama Kimia	37,000
	PT Pamolite Adhesive Industry	45,600
	PT Kayu Lapis Indonesia	28,000
	PT Dover Chemical	40,000
Kalimantan	PT Korindo Ariabima Sari	24,500
	PT Kurnia Kapuas Utama Glue Ind	48,000
	PT Benua Multi Lestari Adhesive	40,000
	PT Duta Pertiwi Nusantara	40,000
	PT Giat Ultra Chemical Industry	40,000
	PT Gelora Citra Kimia Abadi	48,000
	PT Intan Wijaya Chemical Industry	40,000
	PT Lakosta Indah	40,000
	PT Prima Adhesive National	50,000
	PT Cakram Utama Jaya	48,000
PT Batu Penggal Chemical Industry	40,000	
Maluku	PT Nusa Prima Pratama Industry	40,000
West Irian	PT Kayu Lapis Indonesia	60,000
	New Company	40,000
	TOTAL	1,006,100

Source: 1988 Directory, Association of Industrial Formalin and Thermosetting Adhesive.

3.2 SOURCES OF SUPPLY

The supply of melamine resin in Indonesia is all imported. The major country sources include Japan, Saudi Arabia, Singapore and Taiwan (see Figure 4). This is based on import data from the Central Bureau of Statistics which, however, is incomplete.

**Figure 4
Indonesia
Major Country Sources
of Melamine Resin**



Source: Central Bureau of Statistics.

3.3 PROJECTED DEMAND

The projected melamine resin requirement may be supplied by an Indonesian urea fertilizer company. It plans to set up a 30,000 metric ton per year melamine resin plant.

A sensitivity analysis of the forecasted demand (shown on Table 4) indicates that by 1995, the Indonesian market's requirement for melamine resin could already exceed the 30,000 metric tons capacity of the proposed melamine plant, even at the most conservative estimate of a 10 per cent annual growth of the Indonesian plywood industry alone (which, as earlier indicated, is the largest potential market for melamine).

For the past five years, the plywood industry in Indonesia has been growing at an annual average rate of about 20 per cent per year. With foreign markets for plywood increasingly turning to Indonesia (from the Philippines and Malaysia whose wood resources are rapidly getting limited), it is expected that, barring unforeseen circumstances, the country's plywood industry would continue to expand at least at the present level of 20 per cent annually in the next ten years.

The growth of the demand for melamine resin in Indonesia is expected to be parallel to the growth of the Indonesian plywood industry. This 20 per cent annual growth rate in the demand for melamine resin in the next ten years may be realized with the growing market for Indonesian plywood in Japan, which prefers its plywood imports processed using melamine formaldehyde adhesive. At 20 per cent assumed annual growth rate, projected demand for melamine resin is estimated to be about 51,000 metric tons by 1995, and reach 128,200 metric tons by the year 2000 (refer to Scenario A on Table 4).

More conservative estimates, however, of the growth rate of the demand for melamine resin are set at 10 and 15 per cent per year in the next ten years. Likewise, under both scenarios (Scenarios B and C, respectively), demand for melamine resin by the industry in Indonesia could exceed the annual 30,000 metric tons capacity of the proposed melamine resin project in Indonesia by 1995.

Table 4
Indonesia
Projected Plywood Production
and Demand for Plywood Adhesives

	1990 Estimate	1995			2000		
		A	B	C	A	B	C
Projected Plywood Production (000 cu.m.)	8,500	21,200	17,100	13,690	52,600	34,390	22,050
Projected Demand for Plywood Adhesive (m.t.)	595,000	1,568,800	1,200,000	1,013,000	3,892,400	2,400,000	1,631,700
Projected Demand for Melamine Formaldehyde (m.t.)	78,400	203,950	156,000	131,700	512,900	312,000	215,000
Projected Requirement for Melamine Resin (m.t.)	19,600	51,000	39,000	32,900	128,200	78,000	53,800
Projected Demand for Phenol Formaldehyde (m.t.)	119,000	313,800	240,000	202,600	778,500	480,600	326,340
Projected Requirement for Phenol (m.t.)	29,800	78,450	60,000	50,650	194,600	120,000	81,600

A - Projected plywood production and demand for plywood adhesives at 20 per cent annual growth rate.

B - Projected plywood production and demand for plywood adhesives at 15 per cent annual growth rate.

C - Projected plywood production and demand for plywood adhesives at 10 per cent annual growth rate.

Source: Interviews.

The resource base can support the projected growth in plywood production. According to the World Resources Institute, the forest area of Indonesia in 1980 was 114 million hectares. Wood production, as reported, is sourced from about 600,000 hectares of forest per year.

With the establishment of a melamine resin plant in Indonesia, and consequently, the reduction of the import duty and other percentage mark-ups on the selling price, melamine resin would be more competitive in the Indonesian target market. From the prevailing US\$1,350 to US\$1,400 per metric ton, market prices of melamine resin could be reduced by as much as 14 per cent to US\$1,155 to US\$1,200 per metric ton given the cost build-up scheme per metric ton of melamine resin in the next page.

(a) FOB - Jakarta	US\$ 800	US\$ 830
(b) Cost, Insurance, Freight (10% of a)	80	85
(c) C & F	880	915
Other Charges (10% of c)	90	90
Tariff (5% of c)	45	45
(d) Landed Cost	1,015	1,050
Dealer's Mark-up (20% of d)	200	210
(e) Subtotal	1,215	1,260
Value-Added Tax (10% of f)	135	140
(f) Retail Price (100% - base)	1,350	1,400
	=====	=====
Equate FOB Value to Unit Manufacturing Cost:		
(g) Unit Manufacturing Cost	US\$ 800	US\$ 830
Mark-up (30% of f)	240	250
(h) Subtotal	1,040	1,080
Value-Added Tax (10% of i)	115	120
(i) Unit Selling Price	1,155	1,200
	=====	=====

The Freight-on-Board (Jakarta) figure was arrived at by computing upwards from the given retail price and incorporating the given charges (Value-added Tax - 10 per cent and import duty - 5 per cent). The Cost, Insurance and Freight and Other Charges (Bank Charges, etc.) are assumed to be 10 per cent of FOB and C&F, respectively. The dealer's mark-up, on the other hand, is assumed to be 20 per cent of the Landed Cost.

The unit selling price is computed by equating the FOB-Jakarta figure (in the case of imported melamine) to unit manufacturing cost (in the event that a melamine plant be put up in Indonesia). Mark-up on the unit manufacturing cost is set at 30 per cent while value-added tax is 10 per cent.

Under this competitive pricing condition and a distribution agreement with plywood manufacturing groups which usually own the adhesive processing companies, the entrant could initially penetrate as much as 56 per cent of the Indonesian market. This penetration rate is based on the percentage share of the estimated production capacities of total organized plywood manufacturing companies (about 58 companies belonging to 16 plywood manufacturing groups) to total capacities of all plywood manufacturing companies in Indonesia (see Table 5).

Table 5
Indonesia
The Target Market in Indonesia:
The Plywood Manufacturing Groups of Companies

Plywood Manufacturing Group	Plywood	Block Board	Particle Board	Secondary Processing
Alas Kusuma Group	286,140	41,500	---	103,000
Barito Pacific Timber Group	673,847	132,000	---	20,000
Bumi Raya Utama Group	235,677	45,000	102,000	60,000
Djajanti Timber Group	573,951	5,000	---	28,400
Harapan Kita Utama Group	470,295	94,400	---	---
Hendratna Group	57,915	---	---	---
Hutan Raya Indonesia Group	293,869	42,000	---	---
Jati Maluku Timber Group	200,038	28,000	---	---
Kalamur Group	161,801	12,000	12,000	---
Kalimanis Group	247,209	---	10,000	70,000
Kayu Lapis Group	334,620	69,000	---	32,000
Korindo Group	506,882	---	---	---
Satya Djaja Raya Group	247,241	44,400	---	77,800
Sumber Mas Group	255,811	28,000	---	---
Surya Dumai Group	307,809	24,000	12,000	12,000
Tanjung Raya Plywood	200,038	63,000	---	---
<hr/>				
Total Capacities of Plywood Manufacturing Groups	5,052,943	628,300	136,000	403,200
<hr/>				
Total Capacities of Plywood Manufacturing Companies	9,062,043	1,079,200	142,500	1,561,350
<hr/>				
Share (%)	56	58	95	26
<hr/>				

Source: 1988 Directory, Association of Industrial Formalin and Thermosetting Adhesive.

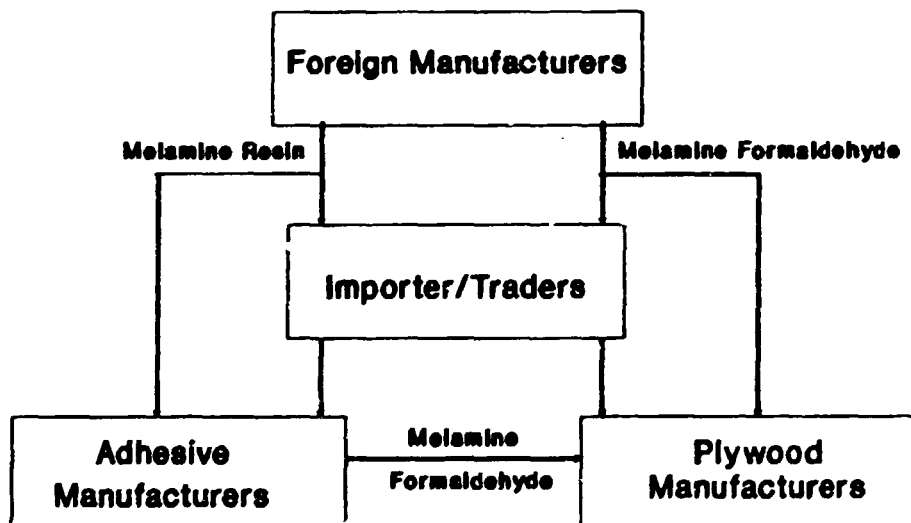
Aside from a melamine resin plant, AIFTA and the Ministry of Industry of Indonesia indicated that a phenol plant will also be set up in the country soon. AIFTA indicated however, that the establishment of the plant to manufacture phenol, the major raw material for the processing of phenol formaldehyde, would not adversely affect the demand for melamine formaldehyde. As a lower-end product, it may, instead, cut into the market for urea formaldehyde.

The phenol project, which will be located in Lhok Sumawe, Aceh, will have a capacity of 40,000 metric tons of phenol and 24,000 metric tons of acetone annually. Incorporated under the name of PT Phenol Swadaya, Inc., it will be an AIJV project with 70 per cent equity coming from Indonesian proponents, and 10 per cent each from Brunei Darussalam, the Philippines and Singapore.

3.4 DISTRIBUTION CHANNELS AND PRICES

Melamine resin is either imported directly by adhesives manufacturers, or through importers/traders (see Figure 5). The adhesives manufacturing companies which are also owned by plywood manufacturers, supply the bulk of adhesive requirements of the plywood mills. Some adhesives, however, are imported directly or purchased through traders.

Figure 5
Indonesia
Typical Channels of Distribution
of Melamine Products



Source: Interviews.

In Indonesia, the prices of melamine resin during late 1989 ranged from US\$1,350 to US\$1,400 per metric ton.

3.5 TARIFF AND DUTIES

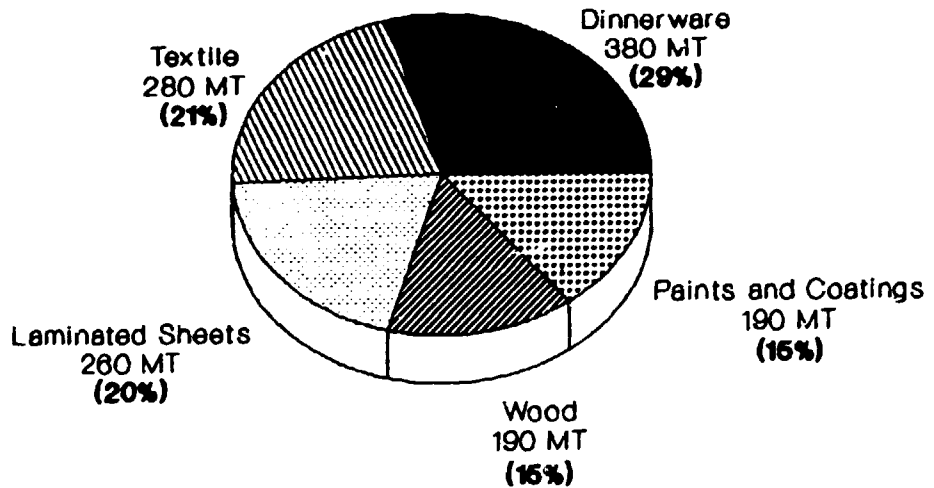
Melamine resin in granular form is subject to five per cent import duty and 10 per cent value-added tax under Indonesia's current tariff and customs code.

4. THE MALAYSIAN MARKET

4.1 MARKET SIZE AND INDUSTRY USERS

The 1989 domestic consumption of melamine resin is estimated at 1,300 metric tons. As presented in the figure below, about 29 per cent was consumed in the manufacture of melamine dinnerware, 21 per cent for textile processing and 20 per cent for the manufacture of melamine laminated sheets.

Figure 6
Malaysia
Estimated Domestic Consumption
of Melamine Resin by Industry, 1989



Total: 1,300 Metric Tons

Source: Interviews.

Interviews indicate that there are four melamine dinnerware manufacturers in Malaysia with an estimated annual consumption of about 950 metric tons of melamine molding compound solutions equivalent to 380 metric tons of melamine resin. Three manufacturers account for about three-fourths of melamine resin usage (see Table 6).

Table 6
Malaysia
Estimated Melamine Resin Consumption
of Dinnerware Firms, 1989

Firm	Annual Turnover (Thousand US\$)	Consumption (metric tons)
Yong Kam Fook Plastic Industries Sdn. Bhd.	4,600	60
Yee Cheong Plastic Manufacturers	1,530	140
Nikko Melamine Industries Sdn. Bhd.	1,530	80
Fourth Firm (Name Not Available)	n.a.	100*
Total		380

n.a. - Not Available.

* Estimated.

Source: Interviews.

The textile industry uses melamine formaldehyde for sizing and finishing. In 1989, the industry's estimated usage is about 1,100 metric tons of melamine formaldehyde equivalent to 280 metric tons of melamine resin. The following presents the names of the three firms interviewed together with their respective equivalent melamine resin usage in 1989:

- o Arab Malaysian Development Berhad - 30 m.t.
- o Malayan Weaving Mills Sdn. Bhd. - 3 m.t.
- o South Pacific Textile Industry Sdn. Bhd. -
0.6 m.t.

The sole manufacturer of melamine laminated sheets in Malaysia is Malaysia Aica Berhad. Melamine laminated sheets are used mainly as tops for tables, and tops and decorative face veneers for cabinets. Malaysia Aica started operations only in 1989. Its annual melamine resin requirement is about 260 metric tons. Malaysia Aica obtains its supply from Norsechem Resins and Borden Chemicals.

The 1989 melamine formaldehyde consumed by plywood and blockboard manufacturers is about 765 metric tons equivalent to 190 metric tons of melamine resin. This is based on computations presented in Table 7.

Table 7
Malaysia
Estimated Usage of Melamine Resin
by the Wood Industry, 1989

	Volume
Plywood	
Production (cu.m.)	905,750
Adhesives Usage (m.t.) (80 kgs. of adhesives used per cu.m. of plywood)*	72,460
Melamine Formaldehyde Used (m.t.) (one per cent of total adhesives)	725
Melamine Resin Equivalent (m.t.) (0.25 m.t. per m.t. of melamine formaldehyde)	180
Blockboard	
Production (cu.m.)	37,720
(m.t.) (1 m.t. = 1.14 cu.m.)	33,090
Adhesives Usage (m.t.) (120 kgs. of adhesives used per m.t. of blockboard)	3,970
Melamine Formaldehyde Used (m.t.) (one per cent of total adhesives)	40
Melamine Resin Equivalent (m.t.) (0.25 m.t. per m.t. of melamine formaldehyde)	10
Total Melamine Resin Consumed (m.t.)	190

* Estimated adhesive usage is 80 kgs. per cu.m. of plywood based on interviews. This is slightly higher than factor used in Indonesia of 70 kgs. of adhesive per cu.m. of plywood.

Source: Malaysian Statistics Bulletin. Department of Statistics, Malaysia.
Interviews.

Interviews indicate that only 10 per cent of Malaysia's paint manufacturers use melamine formaldehyde for surface coatings of motor vehicles and other industries. It is estimated that the industry's 1989 usage of melamine formaldehyde is 750 metric tons, equivalent to 190 metric tons of melamine resin.

4.2 SOURCES OF SUPPLY

There is no manufacturing facility for melamine resin in Malaysia. Requirements by melamine formaldehyde manufacturers are solely met by importations. Melamine molding compound for dinnerware manufacture are also imported.

Trade statistics classify melamine-based products under the more general heading of "other heterocyclic compounds, n.e.s.; nucleic acids". No analysis on melamine products based on trade statistics can be done because further breakdown is not available.

Supply of melamine formaldehyde come mainly from local manufacturers. The identified adhesives processing companies include the following:

- o Malayan Adhesives and Chemicals
- o Norsechem Resins
- o Borden Chemicals
- o Waterbase Chemical
- o Premium Resin.

4.3 PROJECTED DEMAND

Based on indicated government growth targets of industries, the demand for melamine resin is projected to be 1,720 metric tons in 1995 and reach a level of about 2,150 metric tons by the year 2000 as shown in Table 8.

Table 6
Malaysia
Projected Demand for Melamine Resin
(in metric tons)

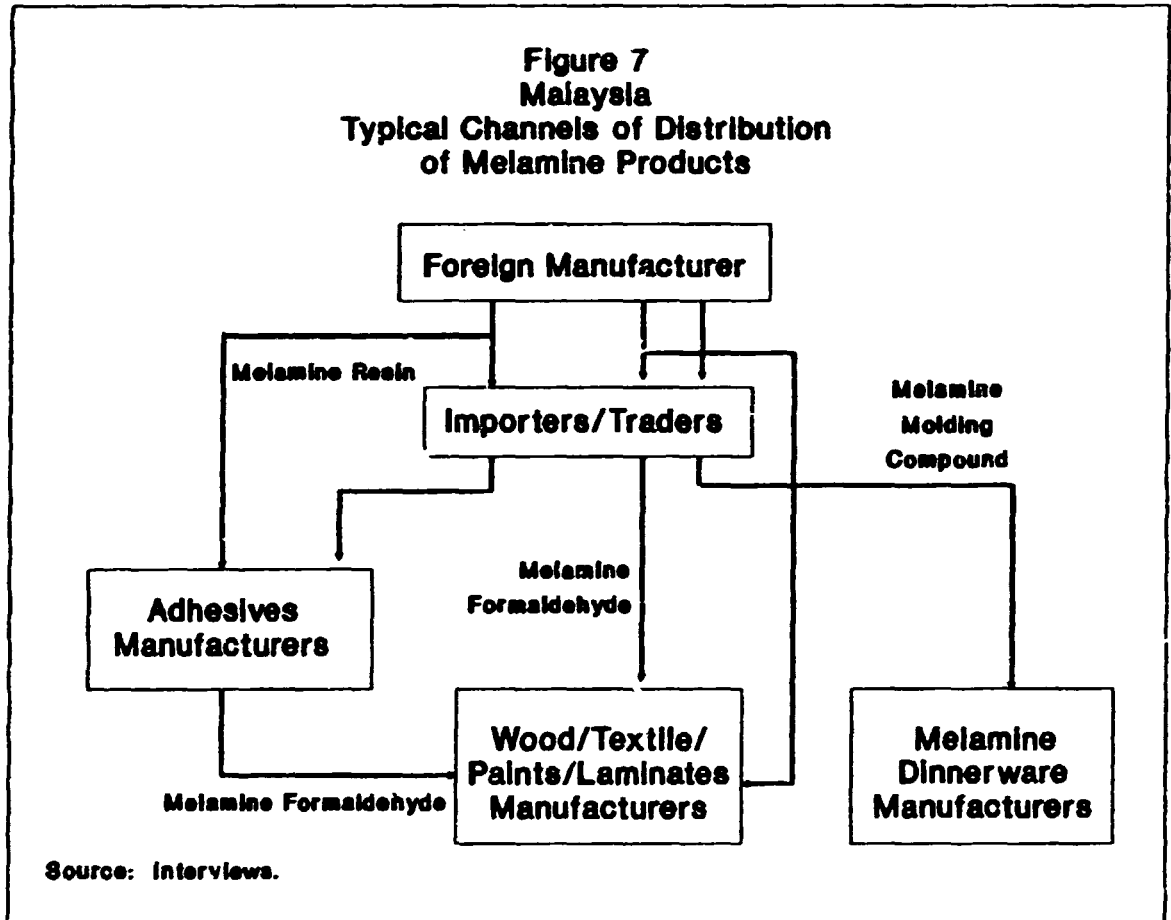
Year	Melamine Dinnerware	Textiles	Lamination	Paints and Coatings	Wood	TOTAL
1989-Estimate	380	280	260	190	190	1,300
1990	400	290	270	200	200	1,360
1995	510	380	350	240	240	1,720
2000	650	480	440	290	290	2,150
Annual Average Growth Rate (%)	5	5	5	4	4	4.6

Source: Interviews.

4.4 DISTRIBUTION CHANNELS AND PRICES

Melamine resin is either imported directly by melamine formaldehyde manufacturers, or through importers and traders (see Figure 7). Melamine formaldehyde, on the other hand, is mainly purchased from adhesives manufacturers. Melamine molding compound solutions are purchased from importers and traders.

Figure 7
Malaysia
Typical Channels of Distribution
of Melamine Products



Source: Interviews.

Melamine resin is available in the Malaysian market at US\$2,000 per metric ton while melamine formaldehyde is available at US\$1,400 per metric ton. The price of phenol formaldehyde, a substitute adhesive for melamine formaldehyde, is about US\$1,100 to US\$1,500 per metric ton.

4.5 TARIFF AND DUTIES

Under Malaysia's Custom Act of 1967, the importation of melamine resin is subject to two per cent import duty.

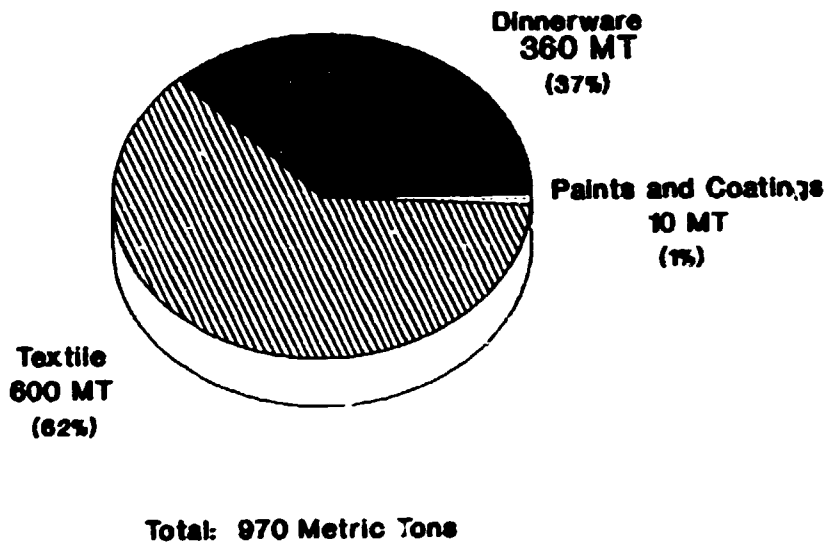
5. THE PHILIPPINE MARKET

5.1 MARKET SIZE AND INDUSTRY USERS

Interviews with user industries and importers indicate that the country's 1989 consumption of melamine resin is around 1,510 metric tons. As shown in Figure 8 below, the major user of melamine resin is the textile industry, accounting for 600 metric tons or 62 per cent of the estimated 1989 domestic consumption. The other users are the melamine dinnerware industry, accounting for 360 metric tons (37 per cent), and the paints and coatings industry, with 10 metric tons (one per cent). The application of melamine formaldehyde by the plywood manufacture industry is found to be currently insignificant. It was found that Philippine wood manufacturers usually use urea formaldehyde for their plywood adhesive requirements.

It has been established that melamine laminated sheets (or Formica) are very popular in the country, but since these are imported by users (furniture makers and board producers) as sheets, rather than as melamine resins, these were not covered in the study.

**Figure 8
Philippines
Estimated Domestic Consumption
of Melamine Resin by Industry, 1989**



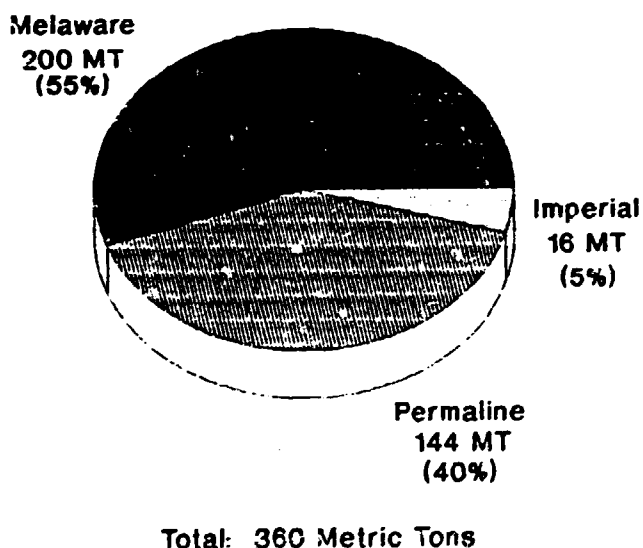
Source: Interviews.

The textile industry uses melamine formaldehyde for textile sizing and finishing. Interviews indicate that 600 metric tons of melamine resin was used by the industry in 1989. Identified major user of melamine formaldehyde for textile sizing and finishing is Universal Textile Mills, Inc., one of the country's biggest denim manufacturers. A list of Philippine textile manufacturers is included in the Appendix.

The melamine dinnerware industry consumed an estimated 900 metric tons of melamine molding compound in powder form in 1989 equivalent to 360 metric tons of melamine resin.

The identified local manufacturers of melamine dinnerware in the country are Imperial Melamine Corporation, Permaline Industrial Corporation and Melaware Manufacturing Corporation. As shown in the figure below, 55 per cent of the total 1989 melamine resin consumed by melamine dinnerware manufacturers in the Philippines was used by Melaware. The balance was used by Permaline (40 per cent) and Imperial (5 per cent).

Figure 9
Philippines
Estimated Melamine Resin Usage
by Melamine Dinnerware Manufacturers, 1989



Source: Interviews.

The paints and coatings industry currently has very minimal requirements for melamine resin. It registered an insignificant 10 metric tons consumption of melamine resin in 1989. Resins, Inc. formulates and sells melamine formaldehyde to paints and coatings manufacturers.

5.2 SOURCES OF SUPPLY

The melamine-based products consumed in the Philippines are imported mainly from Japan and Taiwan.

Trade statistics classify melamine under the more general category of "other heterocyclic compounds, n.e.s.; nucleic acids". No analysis can be derived from import statistics.

5.3 PROJECTED DEMAND

The domestic demand for melamine resin is expected to reach 1,600 metric tons by 1995 increasing to 2,450 metric tons by the year 2000 (see Table 9). This is based on the rate of expansion of user industries as indicated from interviews.

Table 9
Philippines
Projected Demand for Melamine Resin
(in metric tons)

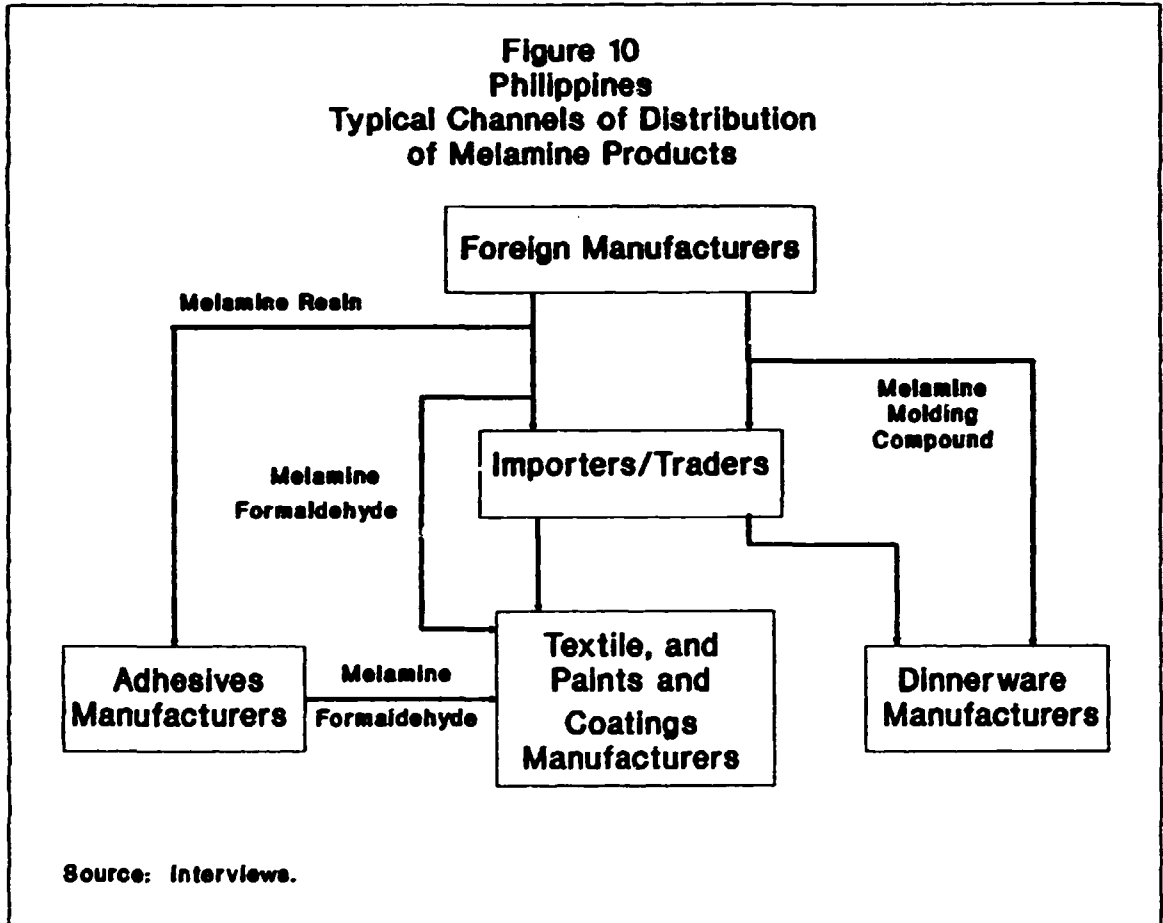
Year	Textile	Melamine Dinnerware	Paints and Coatings	TOTAL
1989 - Estimate	600	360	10	970
1990	660	380	10	1,050
1995	1,060	530	10	1,600
2000	1,710	720	20	2,450
Annual Average Growth Rate (%)	10.0	6.5	5.0	8.1

Source: Interviews.

5.4 DISTRIBUTION CHANNELS AND PRICES

A small amount of melamine resin is imported for the manufacture of melamine formaldehyde. Most of melamine adhesive requirement of the country is purchased directly from foreign sources or through traders. Melamine molding compound in powder form is imported directly from Taiwan and Japan.

Local traders of melamine-based products include Solid State Multi-Products and Trans World Trading Co., Inc.



Local users procure melamine resin from foreign suppliers in Japan and Taiwan at prices ranging from US\$1,700 to US\$1,800 per metric ton.

5.5 TARIFF AND DUTIES

The importation of melamine molding compounds, classified under HS-2933.61.00 of the Tariff and Customs Code of the Philippines, is subject to customs duty of 10 per cent.

6. THE THAILAND MARKET

6.1 MARKET SIZE AND INDUSTRY USERS

Interviews with industry users and importers indicated that the 1989 domestic market for melamine resin is about 1,490 metric tons (see Table 10). This is accounted for by melamine dinnerware manufacturers. About 10 to 15 metric tons of melamine resin is consumed by the paints and coatings industry. Melamine usage by the textile industry is insignificant.

The demand for melamine resin in the local plywood industry is likewise insignificant, with the local plywood producers utilizing urea formaldehyde and phenol formaldehyde as plywood adhesive.

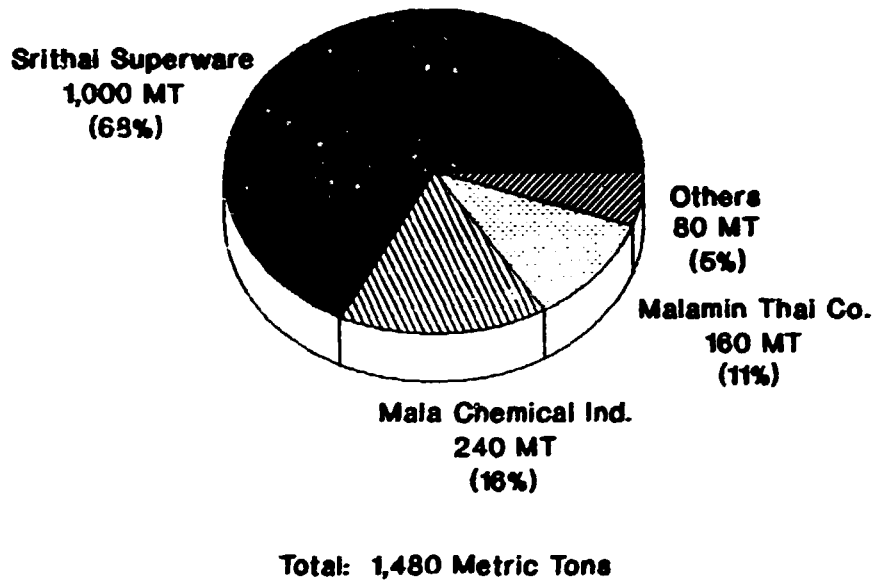
Table 10
Thailand
Estimated Domestic Consumption
of Melamine Resin by Industry, 1989

	Volume -----
Melamine Dinnerware Industry	
Estimated Consumption of Melamine Molding Compound (m.t.)	3,700
Equivalent Melamine Resin Usage (1 m.t. of melamine molding compound equivalent to 0.4 m.t. of melamine resin)	1,480
Paints and Coatings Industry	
Estimated Consumption of Melamine Resin	10
Total Estimated Melamine Resin Usage (m.t.)	1,490

Source: Interviews.

As shown in Figure 11 below, the three melamine dinnerware manufacturers account for around 95 per cent of the domestic melamine dinnerware market. Interviews indicate that demand for melamine by the dinnerware industry increases at an annual rate of 10 per cent.

**Figure 11
Thailand
Estimated Melamine Resin Usage
by Melamine Dinnerware Manufacturers, 1989**



Source: Interviews.

The local paints and coatings industry has an estimated production capacity of 40,000 metric tons per year and a recorded rate of expansion of 12 per cent per year. Interviews indicated that the industry uses only 10 to 15 metric tons of melamine resin as additive.

6.2 SOURCES OF SUPPLY

The melamine resin requirements of Thailand are all imported. About three-fourths of importations come from Japan as shown in the following table. The 1989 importations net of re-exports amounted to 3,680 metric tons, more than twice the estimated usage by industries. This could be due to misclassification of melamine resin to other categories (e.g., melamine molding compound, which has only 40 to 60 percentage component of melamine resin).

Table 11
Thailand
Importation of Melamine Resin
by Country of Origin
and Re-exports
(Volume in metric tons and Value in US\$000)

Imports: Country of Origin	1987		1988		1989*	
	Volume	Value	Volume	Value	Volume	Value
Japan	1,695	2,694	2,154	3,932	3,200	6,400
United States	17	38	270	409	330	610
Taiwan	292	316	513	680	280	340
Italy	294	214	366	257	220	210
Others	1,002	645	300	380	150	320
Total Imports	3,300	3,907	3,603	5,658	4,180	7,880
Less: Re-exports	291	316	551	731	500	770
Domestic Consumption	3,009	3,591	3,052	4,927	3,680	7,110

* Based on January to June preliminary figures.

Source: Thailand Foreign Trade Statistics.

6.3 PROJECTED DEMAND

The domestic demand for melamine resin is projected to grow from about 1,490 metric tons in 1989 to 4,250 metric tons by year 2000 reflecting an annual average growth of 10 per cent (see Table 12). This is based on the indicated growth of user industries from interviews.

Table 12
Thailand
Projected Demand for Melamine Resin
(in metric tons)

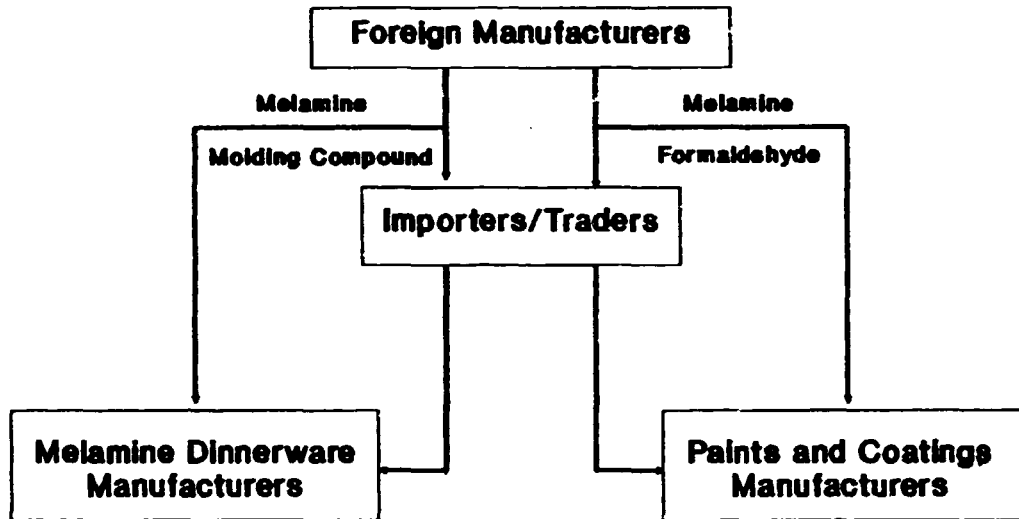
Year	Melamine Dinnerware	Paints and Coatings	TOTAL
1989-Estimate	1,480	10	1,490
1990	1,630	10	1,640
1995	2,620	20	2,640
2000	4,220	30	4,250
Annual Average Growth Rate (%)	10	12	10

Source: Interviews.

6.4 DISTRIBUTION CHANNELS AND PRICES

Melamine molding compound is either imported directly by the local melamine dinnerware manufacturers, or procured from traders. The flow of distribution of melamine resin to the user industries is presented in Figure 12.

**Figure 12
Thailand
Typical Channels of Distribution
of Melamine Products**



Source: Interviews.

The major importers/traders in Thailand are the following:

Company	Nationality of Owners	Share in Trade*
Siam Chemical Industry Co., Ltd.	Thai - 51% Japanese - 49%	90% - 95%
Eternal Resin Co., Ltd.	Thai - 58% Taiwanese - 42%	5% - 10%

* Excludes melamine resin directly imported by users.

Source: Interviews.

Importers and industry users in Thailand procure melamine resin from foreign suppliers. Prices during late 1989 ranged from US\$1,200 to US\$1,900 per metric ton. Melamine formaldehyde prices ranged from US\$1,400 to US\$2,200 per metric ton.

6.5 TARIFF AND DUTIES

Under the Customs Tariff Decree of 1978, the importation of melamine resin in Thailand is subject to a 40 per cent customs duty or Bt8.00 per kilogram. An amendment contained in NMF 7/31 however, reduced the rate to 30 per cent if the said product will be used to manufacture coloring materials.

APPENDIX

Indonesia
Location and Production Capacity
of Plywood Mills
(in cu.m./yr.)

Name of Company	Location	Plywood	Block Board	Particle Board	Secondary Processing
Alas Kusuma Group					
PT Harjohn Timber Limited	West Kalimantan	85,693	16,000	---	43,000
PT Mugi Triman Intercontinental	Jambi	68,175	20,000	---	---
PT Suka Jaya Makmur	West Kalimantan	92,272	5,500	---	---
PT Sari Bumi Kusuma	West Kalimantan	40,000	---	---	60,000
Barito Pacific Timber Group					
PT Barito Pacific Lestari Wood Products	South Kalimantan	92,458	21,000	---	20,000
PT Hutan Domas Raya	Central Kalimantan	60,000	---	---	---
PT Hutrindo Palaran Plywood	East Kalimantan	60,000	16,000	---	---
PT Mangole Timber Producers	Maluku	136,390	21,000	---	---
PT Sinar Barito Indah Plywood	South Kalimantan	100,019	21,000	---	---
PT Sumalindo Lestari Plywood	East Kalimantan	86,911	18,000	---	---
PT Taliabu Pacific Forest Ind.	Maluku	63,649	21,000	---	---
PT Tunggal Yudi Sawmill Plywood	East Kalimantan	74,420	14,000	---	---
Bumi Raya Utama Group					
PT Indah Raya Widya Plywood Industries	South Sumatra	56,037	9,000	---	---
PT Katan Prima Permai	South Kalimantan	51,385	---	---	---
PT Ketapang Indah Plywood Ind.	West Kalimantan	49,041	36,000	---	---
PT Kurnia Jaya Raya Ind.	West Kalimantan	---	---	51,000	30,000
PT Kurnia Kapuas Plywood Ind.	West Kalimantan	---	---	51,000	30,000
PT Kurnia Musi Plywood Ind.	South Sumatra	53,024	---	---	---
PT Tri Ekasari Kalimantan Plywood Industries	West Kalimantan	26,190	---	---	---
Djajanti Timber Group					
PT Artika Optima Inti	Maluku	100,019	---	---	---
PT Bina Segah Utama	East Kalimantan	40,000	---	---	---
PT Cora Prima Plywood Ind.	Maluku	63,649	---	---	---
PT Green Timber Jaya	Maluku	36,371	---	---	---
PT Malex Indah Plywood Ind.	Maluku	51,480	---	---	---
PT Nusantara Plywood	East Java	173,320	5,000	---	28,400
PT Sedia Mulia Utama	Maluku	109,112	---	---	---

Name of Company	Location	Plywood	Block Board	Particle Board	Secondary Processing
Harapan Kita Utama Group					
PT Duta Renjra Mulya	West Kalimantan	302,998	32,000	---	---
PT Tunggal Agathis Indah Wood Industries					
	Maluku	127,297	12,000	---	---
PT Yurina Wood Industries	North Maluku	40,000	50,400	---	---
Hendratna Group					
PT Hendratna Plywood	South Kalimantan	19,305	---	---	---
PT Inka Raya Plywood	South Kalimantan	38,610	---	---	---
Hutan Raya Indonesia Group					
PT Hutrindo Prajen Plywood	South Kalimantan	193,850	18,000	---	---
PT Wana Bangun Agung	West Kalimantan	100,019	24,000	---	---
Jati Maluku Timber Group					
PT Jati Cahaya Cemerlang	Maluku	100,019	14,000	---	---
PT Jati Dharma Indah Plywood Industries	Maluku	100,019	14,000	---	---
Kalamur Group					
PT Kayu Lapis Asli Murni	East Kalimantan	100,019	12,000	12,000	---
PT Melapi Timber	East Kalimantan	61,782	---	---	---
Kalimania Group					
PT Kalhold Utama	East Kalimantan	57,100	---	---	70,000
PT Kalimania Plywood Ind.	East Kalimantan	90,090	---	---	---
PT Kiani Sakti	East Kalimantan	---	---	10,000	---
PT Santi Murni Plywood	East Kalimantan	100,019	---	---	---
Kayu Lapis Group					
PT Inco Veneer	Central Java	---	---	---	12,000
PT Kayu Lapis Indonesia	Central Java	334,620	69,000	---	20,000
Korindo Group					
PT Central Karda	Central Kalimantan	200,038	---	---	---
PT Korindo Abadi	Riau	236,409	---	---	---
PT Korindo Ariabima Sari	Central Kalimantan	70,435	---	---	---
Satya Djaja Raya Group					
PT Erna Djuliawati	West Kalimantan	122,645	14,400	---	8,000
PT Satya Raya Indah Wood Based Industries					
	West Java	56,277	15,000	---	35,000
PT Sukses Sumatra Timber	South Sumatra	68,119	15,000	---	34,800

Name of Company	Location	Plywood	Block Board	Particle Board	Secondary Processing
Sumber Mas Group					
PT Kayan River Indah Plywood	East Kalimantan	94,946	---	---	---
PT Meranti Sakti Indah Plywood	East Kalimantan	63,649	16,000	---	---
PT Sumber Mas Indah Plywood	East Java	97,216	12,000	---	---
Surya Dumai Group					
PT Ewan Super Wood	Riau	---	---	---	6,000
PT Perawang Lumber Ind.	Riau	71,400	---	---	---
PT Rantau Wijaya Sakti	Riau	63,649	---	---	---
PT Surya Dumai Veneer	Riau	172,760	24,000	12,000	6,000
Tanjung Raya Plywood					
PT Tanjung Raya Plywood	South Kalimantan	100,019	21,000	---	---
PT Tanjung Selatan	South Kalimantan	100,019	42,000	---	---
Without Group					
PT Aceh Prima Plywood Ind.	Aceh	57,236	28,000	---	3,200
PT Agung Harapan Co.	DKI	---	---	---	20,000
PT Alfa Glory Indah	West Java	---	---	---	9,500
PT Andatu Lestari Plywood	Lampung	64,350	8,000	---	---
PT Antang Permai Plywood Ind.	Central Kalimantan	70,785	---	---	---
PT Arjuna Perdana Mahkota	Riau	51,915	12,000	---	---
PT Arut Bulik Timber Co.	Indonesia	---	---	---	---
PT Austral Bina	Central Kalimantan	42,000	---	---	---
PT Balikpapan Forest	South Kalimantan	90,090	6,000	---	---
PT Batasan	South Kalimantan	36,371	---	---	---
PT Benua Indah	West Kalimantan	87,761	20,400	---	96,000
PT Candi Kekal Jaya	West Kalimantan	100,019	9,000	---	48,600
PT Daya Besar Agung	North Sumatra	---	---	---	18,000
PT Daya Sakti Unggul Plywood	East Kalimantan	64,350	---	---	---
PT Daya Agung Wood Ind.	South Kalimantan	101,698	15,000	---	37,500
PT Dusun Aro Forest Plywood	East Kalimantan	128,416	---	---	---
PT Dewi Manunggal Raksa Wood Industries	Jambi	65,637	15,000	---	3,000
PT East Borneo Permai Plywood Industries	West Kalimantan	61,011	18,000	---	---
PT Gany Mulia Sejahtera Industries	East Kalimantan	63,649	---	---	---
PT Gunung Meranti Raya Plywood	East Kalimantan	46,380	6,000	---	---
	South Kalimantan	63,649	6,000	---	---

Name of Company	Location	Plywood	Block Board	Particle Board	Secondary Processing
PT Gunung Raya Utama Timber Industries	Aceh	39,445	---	---	---
PT Hartaty Jaya Plywood	East Kalimantan	100,019	24,000	---	87,000
PT Hasil Deliberty Limited	West Kalimantan	32,424	---	---	---
PT Idac Abadi Wood Industries	East Kalimantan	51,430	3,500	---	---
PT Indah Kejora	Central Java	---	---	---	20,000
PT Inne Donghwa Development Co. Ltd.	East Kalimantan	100,019	---	---	---
PT International Timber Corporation Industries	East Kalimantan	13,390	---	---	---
PT Jabar Utama Wood	West Java	---	---	---	37,500
PT Alam Muara Indah	DKI Jakarta	---	---	---	8,700
PT Kampari Wood Industries	Riau	63,649	8,000	---	---
PT Karunia Wana Ika Wood Ind.	South Kalimantan	100,019	---	---	---
PT Katingan Timber Company	South Sulawesi	64,350	---	---	---
PT Kodeco Batulicin Plywood	South Kalimantan	100,019	---	---	---
PT Kutai Timber Indonesia	East Java	89,525	5,400	---	6,000
PT Lambico Sejati	West Java	---	---	---	2,150
PT Limbah Kayu Utama	Jambi	---	---	12,500	---
PT Loka Rahayu Plywood	Jambi	22,119	3,000	---	---
PT Marga Daya Woodworks	West Kalimantan	163,668	15,000	---	---
PT Marina Aneka Mustika	East Kalimantan	75,000	6,000	---	---
PT Meranti Mustika	Central Kalimantan	23,186	6,000	---	26,600
PT Mujur Timber & Co. Ltd.	North Sumatra	79,928	6,700	---	---
PT Mulya Karya Jaya	North Sumatra	12,000	26,000	---	---
PT Muroco	DKI Jakarta	---	---	---	4,300
PT Nansari Prima Plywood Industry	Jambi	28,195	2,000	---	---
PT Nusantara Pacific Veneer Products	Riau	70,785	---	---	---
PT Pacific Bontang Raya Wood Industry Ltd.	East Kalimantan	63,649	---	---	---
PT Panca Eka Bina Plywood Industry	East Kalimantan	63,649	15,000	---	---
PT Panca Usaha Palopo	South Sulawesi	12,031	12,000	---	---
PT Parindo Permai	Lampung	---	---	45,000	---
PT Perfekta Nusa	DKI Jakarta	---	---	---	40,000
PT Peliform	DKI Jakarta	---	---	---	4,500
PT Perhum Perhutani	East Java	---	---	---	6,500
PT Perum Perumnas Unit Produksi Suriakencana	West Java	---	---	---	10,000

Name of Company	Location	Plywood	Block Board	Particle Board	Secondary Processing
PT Putra Sumber Utama Timber	Jambi	100,019	4,500	---	---
PT Raja Garuda Mas	North Sumatra	136,390	7,200	---	177,000
PT Rimba Ramin Pontianak	West Kalimantan	127,297	---	---	---
PT Rimba Sunkyong	West Sumatra	109,112	---	---	---
PT Sangkulirang Bhakti	East Kalimantan	92,664	---	---	---
PT Segara Timber Co. Ltd.	East Kalimantan	49,961	12,000	---	7,200
PT Siak Raya Timber	Riau	115,830	12,000	---	360,000
PT Sola Gratia Plywood Industry Co. Ltd.	Riau	148,005	15,000	---	6,000
PT Song Jaya	DKI Jakarta	---	---	---	2,000
PT Sumatra Sinar Plywood Industry	North Sumatra	61,352	12,000	---	---
PT Sumatra Timber Utama Damai	Jambi	136,390	24,000	---	29,000
PT Surya Satria Timur Corp.	South Kalimantan	40,000	12,000	---	---
PT Tanjung Johor Wood Industry	Jambi	63,649	37,000	---	25,200
PT Tjipta Rimba Djaja	North Sumatra	74,998	12,000	---	62,000
PT Tirta Mahakam Plywood Industry	East Kalimantan	26,785	20,000	---	---
PT Total Jaya Trading	Dji Jakarta	---	---	---	28,500
PT Waenibe Wood Industry	Maluku	63,649	---	---	---
PT Wana Rimba Kencana	East Kalimantan	77,220	---	---	---
PT Wijaya Tri Utama Plywood Industry	South Kalimantan	57,915	7,200	---	---
		9,062,043	1,079,200	142,500	1,561,350
		=====	=====	=====	=====

Source: 1989 Directory, Association of Industrial Formalin and Thermosetting Adhesives.

PHILIPPINE TEXTILE INDUSTRY PROFILE
(February 1986)

A. <u>Integrated Mills</u>	<u>Spindles</u>	<u>Looms</u>	<u>Capacity</u>		<u>Operations</u>	<u>Product</u>
			<u>Spinning (Tons)</u>	<u>Weaving</u>		
1. Artax Development Co., Inc.	50,771	1,584	-	/	4,667	SP W F TR, TC, Linings, 20s
2. Central Textile Mills, Inc.	48,120	1,779	900	/	4,860	SP W F 50/50 TR, 100% C, C/R, Shirts, 36s/24s
3. Evertex Industries, Inc.	12,000	262	-	/	1,835	SP W F TR, Suitings, Draperies, 20s
4. General Textiles, Inc.	54,464	1,400	1,332	/	6,886	SP W F Y C, TR, TC, Denims, Bedsheets, Suitings, 36s/24s
5. Imperial Textile Mills, Inc.	30,240	1,689	1,200	/	5,630	SP W K F TR, TC, P. Oxford, Shirts, Suitings, Ladies Dresses, 38s
6. International Textile Mills, Inc.	61,652	350	-	/	1,782	SP W F ST TR, Shirts, Linings, 30s
7. Kingtex Industrial Corp.	15,440	490	-	/	1,334	SP W F TR, Waste, Linings, Pocketings, 20s
8. Litton Mills, Inc.	35,350	400	4,750	/	6,371	SP W K F 100% C Denims, 10 OE, 24s
9. Lucky Textile Mills, Inc.	45,804	1,188	1,200	/	5,130	SP W P Y C, TC, TR, Pocketings, Ladies Dresses, 20s
10. Lyon Textile Mills, Inc.	53,760	404	-	/	3,220	SP W F 50/50 TR, Oxford, 30s
11. P. Floro & Sons, Inc.	39,500	610	720	/	2,212	SP W K F Y TR, C, Shirts, 24s
12. Rasie Textiles, Inc.	23,308	390	400	/	2,475	SP W F 50/50 P Ram, Ram Blended, Suitings, Curtains, 32 Ra
13. Rosario Textile Mills, Inc.	60,704	956	-	/	5,103	SP W K F Y TR, Ladies, C, TC, Suitings, 30s
14. Solid Mills, Inc.	40,256	928	5,175	/	6,905	SP W F TC, TR, C, A, CVC, T, Denims, Suitings, 10 OE, 20s
15. Southern Textile Mills, Inc.	47,310	534	3,000	/	5,085	SP W K F 100% C, T, P, TR, Denims, Sheeting, Taffeta, 10 OE 38s

16. Universal Textile Mills, Inc.	65,320	1,871	3,900	/	4,267	SP W F Y	TR, TC, C, Suitings
17. Zenith Textile Mills, Inc.	15,248	369	200	/	1,701	SP W K F	TR, Shirtings, Pocketings, 16s
Sub-Total	<u>699,437</u>	<u>15,554</u>	<u>22,867</u>		<u>69,463</u>		
B. <u>Spinning and/or Weaving Mills</u>							
1. Acme Knitting & Mfg. Co., Inc.	12,752	134	-	/	429	SP W F	TR, C, Shirtings, 20s
2. Aristocrat Weaving	-	180	-	/	441	W	C, TR, Suitings, Handkerchiefs
3. Asia Cotton Mfg. Co., Inc.	-	32	-	/	1,104	W	C, Towels
4. Asia Textile Mills, Inc.	19,000	400	-	/	2,940	SP W	P, TR, Suitings, 24s
5. Central Knitting and Weaving Mills, Inc.	-	119	-	/	1,410	W K	C, Towels
6. Chosont	-	36	-	/	283	W	Acrylic, Rayon, Upholstery, Materials
7. Clover Mfg. Co., Inc.	3,200	150	1,050	/	952	SP W	100% Acry, C, Denims, 2/40dm
8. Delta Weaving	-	20	-	/	176	W	Polyester, Nylon, Acrylic, Rayon, PP, Yarn, Upholstery Materials
9. FilFiber	-	24	-	/	84	W	P, Silk, Barongs
10. Filipinas Textile Mills, Inc.	-	328	-	/	3,307	W K F	C, Towels
11. Filtex Manufacturing Corp.	-	94	-	/	517	W	P, T/R, Suitings
12. Galmart Ind. Phils., Inc.	-	85	-	/	-	W K F	
13. Ind. Fibre, Products	-	109	-	/	109	W	Nylon, Polyester, Filament, Tafetta
14. Pacific Mills, Inc.	41,344	74	1,000	/	-	SP W K Y	TR, C, 14 OE, 36s
15. Paramount Textile Mills, Inc.	10,030	248	-	/	1,294	SP W	TR, Linings, Pocketings, 24s
16. Philippine Knitting Mills, Inc.	31,440	305	270	/	-	SP W K F	TR, 20s

17. Sunreyno	-	119	-	/	542	W	C, T/R, T/C, T/Ramie, Suitings, Ladies Dresses
13. Universal Robina Corp.	50,000	342	910	/	2,592	SP W X P	50/50 TR, CR, CVC, P, Rafetta, Suiting, 32s
19. Yupangco Cotton Mills, Inc.	<u>2,072</u>	<u>1,595</u>	-	/	<u>6,668</u>	SP W Y	C/R, Waste, Flour Bag Cloth 3s
Sub-Total	<u>159,938</u>	<u>4,444</u>	<u>3,130</u>		<u>22,918</u>		

C. Spinning Mills

1. Alliance Textile Mills, Inc.	35,775	-	3,600	/	-	SP	Y	C, TR, TC 33s
2. Allied Thread, Co., Inc.	13,352	-	1,180	/	-	SP	ST	C, T 40s
3. Anchor Polytex (Empire Weaving)	7,200	-	58	/	-	SP	Y	50/50 TR 36s, 20s
4. Continental Manufacturing Corp.	25,904	-	4,275	/	-	SP	Y	100% Acryl, 50/50 Aram 36s
5. Diamond Knitting Corp. (Ass. Cotton)	10,000	-	-	/	-	SP	Y	TR Waste 10S
6. Indo Phil Textile Mills, Inc.	23,184	-	3,120	/	-	SP	Y	TR, TC, A 30s
7. Mabuhay Textile Mills Corp.	16,000	-	3,000	/	-	SP	H	Acrylic 16 mm
8. Malayan Textile Mills, Inc.	13,592	-	792	/	-	SP	Y	50/50 TR 33s
9. Manila Bay Spinning Mills, Inc.	45,323	-	3,600	/	-	SP	Y	30s
10. Multi-Fiber	3,200	-	-	/	-	SP	Y	TR Waste 10 OE, 10s
11. Northern Textile Mills, Inc.	15,120	-	-	/	-	SP	Y	TR Waste 20s
12. Peggy Mills, Inc.	22,600	-	2,000	/	-	SP	Y	C, TR, TC 33s
13. Solid Development Corp.	45,552	-	2,250	/	-	SP	Y	TR, C 14 OE, 30s
14. Tri-Union Industrial Corp.	35,000	-	3,450	/	-	SP	Y ST	C, TR, TC 33s
15. Unisol Ind. & Mfg. Corp.	36,480	-	3,600	/	-	SP	K Y	C, TR, TC 36s
16. Universal Synthetic Mfg. Corp.	21,800	-	270	/	-	SP	Y H	A, TR, TC 14 OE, 30s
17. Western Textile Mills, Inc.	19,920	-	-	/	-	SP	Y	TR 20s
Sub-Total	<u>395,084</u>	-	<u>31,205</u>					
Grand-Total	<u>1,264,409</u>	<u>19,998</u>	<u>57,202</u>		<u>92,301</u>			

1/ Export Capacity

OTHERS

Allied Textile Mfg. & Trading Co., Inc.
 Continental Nishijin Dyeing Corp.
 Continental Tamamura Phils. Mfg., Inc.
 Conrad Mark Textile
 Daiwa Industries
 Darren Manufacturing Corp.
 Filipinas Synthetic Fiber Corp.
 Just Textile Finishing
 Liberty Cotton Mills
 Manila Bay Hosiery
 Manila Bay - J.P. Coats
 Monaco Industries
 Redson Textile Mfg. Corporation
 Rowan Trading
 SowLead Manufacturing
 Tex Fiber
 Universal Tricot
 Vitaon Manufacturing

OPERATIONS

K
 Synthetic Yarn Dyeing
 Synthetic Yarn Dyeing
 K W F
 K
 TW K D
 Extrusion PE (FIL/Fiber)
 D
 ST TW D
 TX H D
 ST TW D
 ST TW D
 K D RTW
 ST
 ST Rewinder
 Extrusion Nylon Filament
 KD
 TW Towels

K	Knitting
D	Dyeing
GCF	Grey Cloth Finishing
ST	Sewing Thread Manufacturer
SP	Spinner
W	Weaver
CP	Continuous Filament
Y	Yarn Sales
F	Cloth Finishing
H	Hosiery
TX	Texturizing
TW	Twisting
RW	Rewinder