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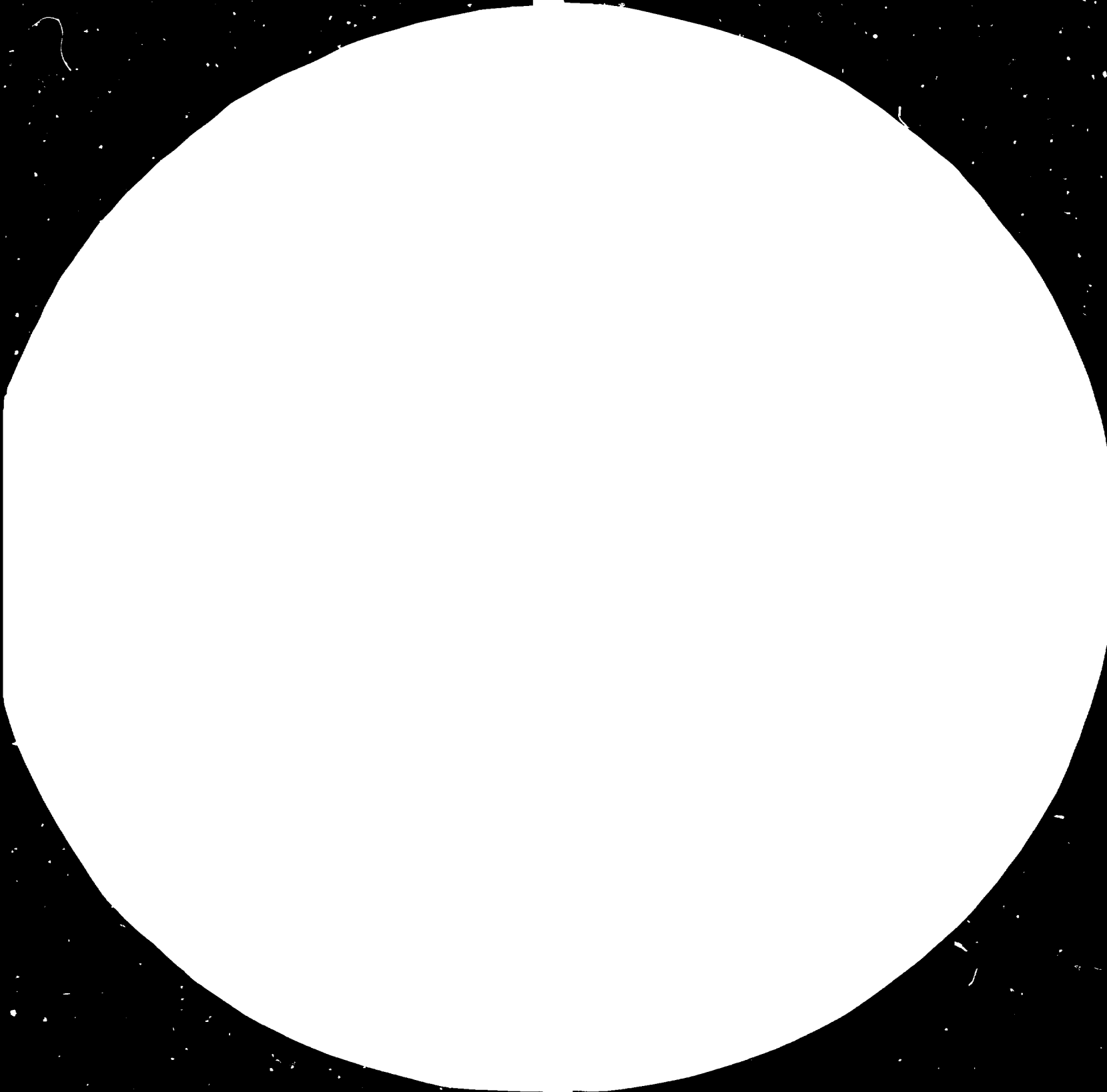

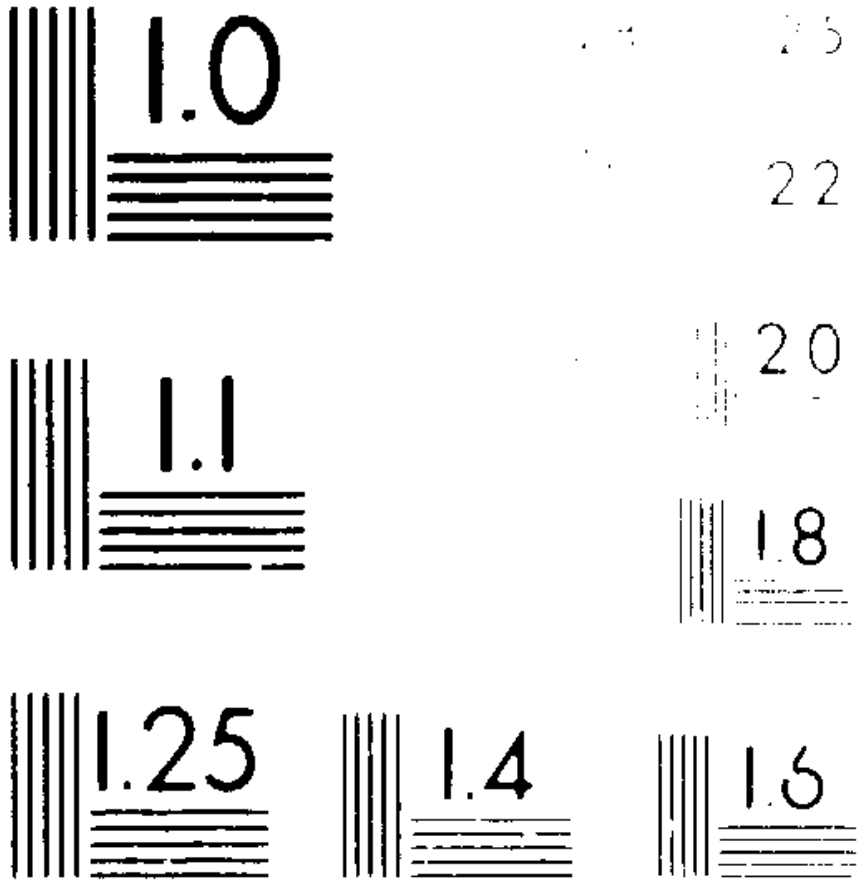
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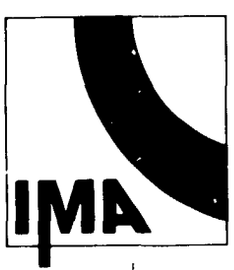

INTERNATIONAL MARITIME ASSOCIATES, INC.

13661

SURVEY OF THE MALAYSIAN SHIPBUILDING/ SHIP REPAIR INDUSTRY

DP/MAL/83/003

Prepared for:

The United Nations Industrial
Development Organization
Vienna, Austria

as executing agency for
United Nations Development Programme

by:

International Maritime Associates, Inc.
Washington, D.C.

May 4, 1984

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EXECUTIVE SUMMARY

The existing shipbuilding/ship repair industry in Malaysia consists of two large, five medium size and more than 20 small shipyards. More than 4,000 workers are employed in this industry. It is perhaps the only major domestic industry now making intermediate level engineered assemblies. There are important linkages with the government industrialization plan.

Problems

Over the past ten years there has been substantial shipyard expansion. Three major investments have been made in new shipyards: MSE, Sabah Shipyard, and the Lumut Naval Facility. Almost $1 billion has been invested in these three yards. The expansion has been largely uncoordinated. Shipyard expansion combined with depressed market conditions has produced a highly competitive situation. Too many shipyards are chasing too little business in Malaysia.

A second problem is foreign competition. For ship repair, Singapore has become the world's leading industrial center. It is difficult to compete with such a well-established power. Particular difficulty is experienced by MSE, who has virtually no geographical insulation. For shipbuilding, Korea and Japan are the world's major industrial centers. Both countries have over capacity and the Korean and Japanese governments are financially assisting their shipbuilding industry. Prices and financing terms being offered by Korean and Japanese yards are extremely attractive. Malaysian shipyards -- and shipyards in other countries -- find it impossible to compete without some form of protection.

The third problem is absence of a supporting industrial infrastructure. Almost all material and components required for ship construction and repair in Malaysia must be imported.

Overlaying these problems is absence of a plan for the sector. No priority has been established for its development. No agency exists to coordinate its growth. Many government bodies at the federal and state level are involved. Bank Kemajuan, directed to help finance this sector, is without overall planning guidance.

Recommendations

The Malaysian shipbuilding/repair industry should be rationalized. Controlled shrinkage is required, coordination among yards is needed, and some degree of yard specialization should be encouraged. Two likely merger candidates recommended are PSC and Hong Leong-Lurssen, and Ironwoods and Brooke Dockyard. It is recommended that LTSB revert to a training facility. It is also recommended that MSE, Promet, Sembawang and Sabah Shipyard coordinate as a group to pursue offshore engineered assembly work.

A central coordination point for the shipbuilding/ship repair industry should be established within the government. The Fourth Malaysia Plan calls for establishing a Ministry of Maritime Affairs. It is recommended that the newly formed Ministry coordinate and administer shipping and shipbuilding policy and plan industry development.

Macro planners in the government should establish the priority which should be accorded the shipbuilding/repair sector. Attempts to help

develop this sector will consume financial resources. To know if such resource use is justified the relative priority should be understood.

Assuming at a macro planning level the sector justifies the economic commitment, steps should then be taken to improve market demand:

- o formulate and implement regulations to restrict use of inefficient and unsafe vessels in Malaysian coastal trade
- o enact legislation requiring domestic trading ships to be built in Malaysia
- o restrict importation of secondhand ships
- o provide incentives for Malaysian owned ships to be repaired domestically
- o employ leverage on firms using Malaysian natural resources to use Malaysian shipyards
- o provide financing for selective, high quality ship export sales
- o assist in improving shipyard technology
- o eliminate duties and import restrictions involving ship construction and repair

Several actions are recommended to improve yard efficiency. To minimize technical inflexibility, yards such as MSE should have several senior personnel in the yard who can make on the spot adjustments to work orders as a job progresses. Training programs tailored to shipyard requirements should be established by the government. Quality assurance program development should be emphasized with the help of foreign technical experts.

MSE should diversify into production module fabrication. This is a very important market -- which until now MSE has not been able to penetrate. It should aggressively pursue the market and take the necessary

actions to ensure successful performance. The government -- particularly Petronas -- should assist by encouraging companies developing the Malaysian offshore oil fields to utilize Malaysian industry for platform fabrication.

Development of ancilliary industries should be very carefully managed. An objective of shipyard development is to provide industry spin-off effects. However, too rapid attempt to meet this objective can kill off the shipyards. They need to be reasonably competitive in price, quality and schedule.

I. INTRODUCTION

The Malaysian shipbuilding and ship repair industry is a major industrial activity. It directly employs over 4,000 persons. This industry is among the initial activities in the country's heavy industrialization program.

1. Background

Prior to the mid-1970's there was very limited domestic shipbuilding and repair capability in Malaysia. Requirements for new tonnage and vessel servicing were satisfied in Singapore and elsewhere.

The first major expansion was construction of Malaysia Shipyard and Engineering, which opened in 1976 to drydock and service large ships. This yard appeared to have substantial market potential. Its location in Johore provided ready access to cargo ships trading between Europe and Asia. Tankers carrying oil to Japan and other Asian nations passed nearby. Unfortunately the oil market changed and competition for available repair work was more severe than anticipated. The first eight years have been rough going for MSE. Over $200 million has been invested and 1983 was the second year to break even.

Sabah Shipyard in Labuan was the second major expansion. This yard opened in 1982 to build and repair ships up to 8,000 DWT. Over $100 million has been invested. In two years of operation the yard has lost over $100 million.

The third major expansion is the new facility at Lumut to service naval ships. Almost $600 million has been invested in constructing this shipyard. It will be in full operation by the end of this year.

Bank Kemajuan Perusahaan Malaysia Berhad was established in August 1979 to finance capital intensive and high technology industries. The Bank was directed to give top priority to financing projects in the maritime sector. Bank Kemajuan has thus become the government conduit for promoting growth of the shipbuilding and ship repair industry.

2. Objective

This work is to result in recommendations for developing the shipbuilding and ship repair sector in Malaysia. It is to assist the Government in setting realistic goals and objectives for this sector. Investment needs are to be identified, priority projects recommended, and improvements suggested which help overcome current problems.

3. Scope and Limitations

This assignment was performed over a two month period. The level of effort was 4.25 man-months.

Each of the major shipyards and a representative sampling of small yards were visited as part of the assignment. Meetings were held with government officials to obtain views about the shipyard sector. Data available and plans for supporting industry sectors were obtained and assessed to the extent possible within the framework of the project.

This analysis focuses on one sector of the Malaysian economy. While linkage of the sector to the industrialization plan is considered, the priority and extent of government commitment which should be accorded this sector is beyond the scope of the study. Full consideration of such priority and commitment can only be made at the overall planning level. This is an important limitation as recommendations in the final chapter involve government financial expenditures. Whether these expenditures are warranted is a question for macro planners dealing the the whole economic picture.

Data for coastal shipping are not consistently maintained. In consequence, analysis of ship replacement requirements for the coastal fleet is somewhat speculative.

4. Organization of Report

The role of shipbuilding in the Malaysian industrial base is first considered. This is followed by a presentation of the existing industry. Markets are then examined, the regional shipbuilding/repair situation is described and a special assessment is made of diversification opportunities for MSE. The final chapter outlines a proposed development plan.

II. MALAYSIAN INDUSTRIAL SECTOR

Shipbuilding and ship repair must be considered in the context of overall industry planning. It is part of a larger picture. The industry has linkages with other industries as both customer and supplier.

1. Nature of Shipbuilding and Repair

Shipbuilding is a steel fabrication business. Activities involve purchasing components, making subassemblies, and erecting and moving large completed units. It most closely resembles commercial building construction.

Ship repair is a service activity. It involves replacement of steel plates, hull cleaning and painting, and mechanical overhaul. Contrasted to new construction, there is less opportunity for repetitive work. Turnaround time is of great importance. Planning and scheduling is more difficult.

Both businesses are labor intensive. Each requires capability to weld, perform electrical work, handle heavy steel plates, and install and test mechanical systems.

This sector is wide open to international competition. Ships are repaired at the most convenient location. Owners contract for new ships virtually anywhere in the world, based on price and financing considerations. Governments play active roles promoting their domestic industry through various forms of subsidy.

Shipyards are relatively easy to start up. Construction technology is relatively simple. There have been recent examples of starting greenfield

yards and beginning ship construction in parallel. There has been and continues to be a worldwide shift of industry to low labor cost locations. Ship construction has shifted from Europe to Japan, and is now shifting to Korea. Ship repair has settled in areas of abundant, low cost labor strategically located relative to trade routes.

2. Linkage With Present Malaysian Industry

Exhibit I depicts a heirarchy of engineering industry in terms of product sophistication. Arrows indicate flows of products and technology. Technological complexity increases from left to right. Products and technology can flow out at each level, or flow to the next level to be incorporated into a more complex product. Industries at each level comprise thousands of different products. Complex linkages connect makers of components, subassemblies and end products.

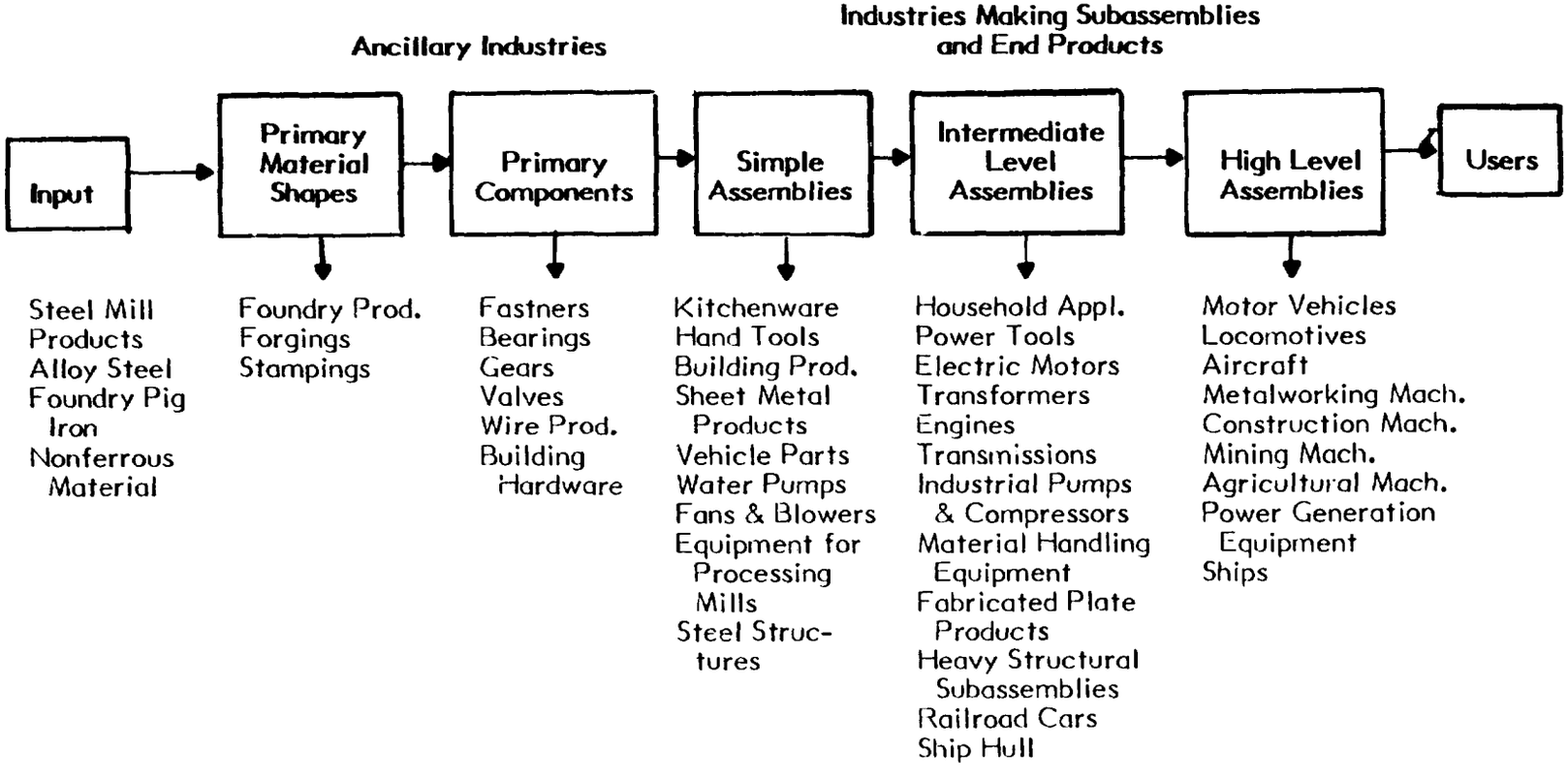
Measured by state of advancement of engineering industries, industrialization has not kept pace with growth of the Malaysian economy. A very limited variety of goods is made locally and there appears to be little production linkages among local manufacturers.

Most engineering establishments are small to medium sized enterprises making technically unsophisticated products for home and construction uses or supplying repair and replacement parts for imported machinery and equipment.

The Malaysian Industrial Development Authority (MIDA) made a survey of 81 metalworking establishments in 1982. Results show the

Exhibit 1
Malaysian Shipbuilding & Repair Industry

Structure of Engineering Industries by Levels of Product Sophistication



following number of firms at each level of engineering:

o	Primary metal shapes and components	
	- foundry products	24 units
	- machinery pts. (gears, etc.)	11 units
	- others (wire products, etc.)	12 units
o	Simple assemblies:	
	- home & bldg. products	23 units
	- industrial products	11 units

The more important existing engineering firms are listed in Exhibit 2. These data are based on the MIDA survey.

Foundries are important building blocks for industrialization. The MIDA survey indicates there are 16 foundries in Malaysia employing 30 or more workers. Only four foundries responding to the MIDA survey had output in excess of 2,000 tons in 1982. These foundries would be too small scale to justify modern installations or casting methods such as in melt control, sand preparation, etc. to produce acceptable machine-grade castings for original equipment manufacture. This industry will need a considerable upgrading of capacity and capability to become a positive factor in the development of downstream manufactures.

The capability to produce machined and heat-treated parts to OEM quality and specification is basic to all types of machinery and equipment manufacture. No such capability is apparent with establishments surveyed by MIDA. All are either job shops or service shops supplying repair and replacement parts. Of the 11 machinery parts manufacturers, five employed 30 or more workers.

Exhibit 2
Malaysian Shipbuilding & Repair Industry

Existing Supporting Engineering Industries in Malaysia

Establishment	No. of Employees	Location	Products
Grey [illegible]			
[illegible] Foundry	50	[illegible], Perak	[illegible] parts
[illegible]	82	[illegible]	[illegible] parts
[illegible] Metal Eng.	3[illegible]	[illegible]	[illegible] parts
[illegible] Won Cheong Found.	32	Ipoh, Perak	[illegible] parts for [illegible]
[illegible] Besi	187	[illegible], Negeri Sembilan	[illegible] parts, [illegible]
[illegible]	1[illegible]3	[illegible] Alam, Selangor	[illegible] parts
[illegible]	85	[illegible], Perak	[illegible] parts for [illegible]
[illegible] Eng. Works	6[illegible]	[illegible]	[illegible] parts
[illegible] Eng. Works	84	[illegible]	[illegible] parts, [illegible]
[illegible] Foundry	5[illegible]	[illegible], Perak	[illegible] parts
[illegible]	405	[illegible]	[illegible] parts
Iron & Steel Castings			
[illegible] Lee Yoon Foundry	238	Ipoh, Perak	Parts for [illegible], pumps, etc.
[illegible] Iron & Steel Foundry	60	Ipoh, Perak	Parts [illegible]
Alloy Castings			
[illegible]	128	[illegible]	Valves [illegible] components
[illegible] Diecasting			
International Diecasting	87	Petaling Jaya, Selangor	Appliance parts, [illegible]
[illegible]	138	Port Klang, Selangor	Small appliance parts
Machine Shops			
[illegible] Gears	90	Seremban, Negeri Sembilan	Gears for [illegible]
[illegible] Malaysian Precision Eng.	50	Penang	Makes parts to customer's specifications
[illegible] Eng.	52	Petaling Jaya, Selangor	Tools & [illegible]
[illegible] Engineers	3[illegible]	K.L.	[illegible] parts for industrial gears, [illegible], pulleys, etc.
[illegible] Eng.	10[illegible]	Shah Alam, Selangor	[illegible], [illegible], buckets, etc.
Industrial Product Manufacturers			
[illegible] Industries	32	Shah Alam, Selangor	Steel [illegible] products
[illegible] Coachbuilders	55	K.L.	[illegible]
[illegible] Eng. Works	76	K.L.	[illegible] equipment ([illegible], dryers, etc.) and steel structures
[illegible] Eng.	125	K.L.	Palm oil mill equipment, steel structures
Syarikat Kejuruteraan [illegible]	50	Klang, Selangor	Palm oil mill equipment, also flour mill equipment, feed mill equipment
Syarikat [illegible]	63	[illegible], Sabah	Truck bodies, trailers

Source: [illegible], Directory of Ancillary and Supporting Industries in Malaysia, [illegible].

A limited variety of simple end-products is made in the country. These include home and building products such as filing cabinets, kitchen sinks, sunscreens, and aluminum doors and windows. Also included are industrial products such as commercial vehicle bodies, trailers, welded steel structures and palm oil mill equipment. These simple assemblies involving light fabrication require relatively little capital, and the relevant technologies and skills are not difficult. In view of the apparent large market that these establishments serve, it is surprising that this area of activity has not developed more. There were six industrial products manufacturers employing 30 or more workers. Only one of these establishments employs more than 100 workers.

So it is not surprising when shipyards indicate, as they have, that little equipment is purchased locally. There is virtually no domestic industry to support the shipyard sector. All equipment, supplies and machinery services must be imported. There is no domestic input linkage. Linkages which exist are between domestic shipyards and the engineering industries in Singapore and Japan.

Shipyards were not covered by the MIDA survey. Yet they possibly represent the only significant capability in the country to make intermediate level assemblies such as heavy fabricated structures and plate products.

In terms of output linkages, domestic shipyards have supplied fabricated assemblies for palm oil mills, flour and feed mills, oil processing plants, offshore oil production platforms, and engineering workshops.

3. Government Industrialization Plan

Government policy is to rapidly catapult Malaysia into an industrial power. The goal is to increase manufacturing share of GNP from the present 18 percent to the industrialization threshold of 23-24 percent. This is to be achieved by creating new engines of growth which have strong forward and backward linkages.

The Mid Term Review clearly states the strategy to be followed in implementing this policy. Heavy industries are to be developed. These industries will generate forward and backward linkages for development of other industries. Projects planned as part of this strategy include cement plants, sponge-iron plants, a methanol plant, an ammonia-urea plant, and an automobile plant.

The Heavy Industries Corporation of Malaysia (HICOM) is studying the feasibility of establishing big scale foundry and forging facilities to service requirements of the engineering industries. According to the HICOM Chairman, growth and development of engineering related industries that utilize semi-finished steel products is encouraged. The Chairman adds that downstream industries using finished steel products should also be developed.

As noted earlier, a critical problem of the existing engineering industry in Malaysia is the weak base. Development of this base, based on experience of many advanced industrializing nations, is best achieved not by a long shopping list of projects. It is achieved by focusing attention and

resources on a short list of production activities (building blocks) that:

- o are favored by a country's circumstances and can potentially be made at a cost advantage
- o have inherent potential for causing the formation of supporting industries, and
- o can be expected to foster basic knowhows and skills which will benefit a wide spectrum of other production activities

4. Shipbuilding/Ship Repair In Context Of Industrialization Plan

Few industries seem to better fit the government plan. Shipbuilding can be cited as a building block candidate. Being primarily a steel fabrication operation, it is well-suited to countries with low-cost labor. Because the activity requires broad support from other industries, it can be expected to foster the growth of supporting industries. It has spin-off potential in that shipyards procure many types of manufactured products and service. The output of the industry can be exported.

Of great importance is the manufacturing potential offered by a well-equipped shipyard. A shipbuilding enterprise is not tied to ships as a final product to the same degree that, for example, an automobile plant is tied to automobiles. Its production methods, skills and equipment are not specifically end-product oriented. The same capabilities and facilities for constructing ships are required for constructing most capital equipment falling in the heavy machinery category, e.g., heavy structural subassemblies, heavy lifting equipment, large plate products, etc. A shipbuilding facility can be thought of as being closer to a primary fabrication facility than to a product specific facility.

Perhaps the most important fact is that the industry is now in place. There is a Malaysian shipbuilding and repair industry. It employs 4,400 workers, many of whom are skilled or semi-skilled. It now produces sophisticated products. It competes, albeit with difficulty in the international market for ship repair work and new construction.

EPU has stated that government is "looking east" to Japan, Korea, Taiwan for growth management models. These countries have successfully industrialized their economies. Each of the three countries has developed its shipbuilding sector. In fact, shipbuilding in Japan and Korea was among the vanguard industries in their industrialization drive.

But as previously stated, shipbuilding and ship repair functions in an international market. There are few natural barriers to restrict competition. Many yards have been built in Japan, Korea, Singapore and elsewhere. There is a great surplus of building and repair capacity. Yards with sunk costs are competing for work at prices which just cover direct expenses. Governments subsidize their shipbuilding industries to help yards compete for work. In other words, it is a difficult market to (1) penetrate and (2) be profitable.

Properly structured and coordinated, Malaysian shipyards can play a key role in the industrialization drive. A realistic plan should be followed to focus on market nitches where special domestic capability exists -- or can be created. Head-on competition with Korean and Japanese yards will be an expensive exercise and should be avoided. Encumbering yards with

excessive requirements to use domestic manufacturing sources, rather than sources in Singapore and Japan will make them noncompetitive. Protective policies requiring shipowners to build and repair locally will raise shipping costs (and produce outrage) unless domestic yards can bring costs to within reason.

III. SHIPBUILDING AND SHIP REPAIR INDUSTRY

There are two major shipyards, five medium size yards and over a dozen small yards in Malaysia. The consultants visited each of the major and medium-size shipyards, and five small yards. This chapter describes these facilities and examines the issues that confront each yard.

1. An Overview

Exhibit 3 summarizes the facilities, specialities, target market and financing requirements of twenty Malaysian shipyards. The facilities range from the sophisticated repair and building complex at MSE to simple facilities in Sibu and Miri which build and drydock small coastal and river vessels. Yard employment ranges from 1800 + employees at MSE to yards with 20 $\pm$ employees. While Bank Kemajuan current commitment is concentrated in three shipyards, virtually all yards have interest in future financing.

2. Penang Shipbuilding Corporation

This was the first yard the consultants visited. It is located on an island off Penang and is assessable by launch. Travel takes about 20 minutes. The yard is located on the site of a former health isolation area. Many of the former wards and administrative buildings are used as workshops and offices.

Yard	Facilities/Employees	Specialties	Target Market
Penang Shipbuilding Corporation (PSC) Penang	Two slipways (150 metre & 120 metre); one 136 ton mobile crane, eight smaller mobile cranes; steel fabrication shops; two floating repair docks; 456 employees	Small craft and dredger construction, small vessel repair	Offshore workboats, patrol boats, coastal feederships, marine & industrial fibreglass construction
Hong Leong-Lurssen (HLL) Butterworth	60 metre, 700 ton Syncrolift with rail transfer system to fabrication shop; diesel overhaul workshop; 340 employees	Patrol boat and tugboat construction, engine overhaul, patrol boat repair	Construct & repair patrol boats, harbor boats, fishing boats
Malaysia Shipyd. & Engineering (MSE) Johore	Repair Facility: Two graving docks (400,000 & 140,000 DWT); one 80 ton and four 15 ton cranes; fabrication and engineering support shops New Construction Shop: 47 metre shiplift with transfer system to fabrication shop; engine overhaul workshop Heavy Engineering: Ten hecture fabrication area including loadout jetty for modules up to 1500 tons; 150 ton crawler crane; separate rolling stock assembly workshop; 1829 employees	VLCC/ULCC repair, patrol boat, dredger and small craft construction, offshore accommodation modules, other structural fabrication	Patrol boat and dredger construction, VLCC/ULCC repair, offshore production modules, other heavy fabrication
Limbongan Timor Sdn. Berhad (LTSB) Kuala Trengganu	Two slipways (100 metre & 80 metre), fabrication shops, carpentry shop; 200 employees	Wooden & steel hull small craft construction & repair	Patrol boat, offshore supply boat construction
Brooke Dockyard Kuching	73 metre repair dock, small vessel slipway; machine shop; separate area for construction; 230 employees	Small boat construction and repair	Sarawak gov't. boat repair

Exhibit 3
Malaysian Shipbuilding & Repair Industry

Industry Composition & Financing Requirements

Target Market	IDB Involvement	Financing Requirements
Offshore workboats, patrol boats, coastal feederships, marine & industrial fibreglass construction	(1) $2.2 mil loan for floating drydock (2) $.6 mil equipment lease (3) $17.0 mil tug bridging loan (4) $1.1 mil barge term loan	$25 million for new building dock and support workshops
Construct & repair patrol boats, harbor boats, fishing boats	None	IDB guarantee for export financing of fishing boats
Patrol boat and dredger construction, VLCC/ ULCC repair, offshore production modules, other heavy fabrication	(1) $3.0 mil ship repair financing (2) $7.0 mil ship repair financing (3) $25.0 mil shipyard improvement loan	Asking 7 year deferral of $173 mil debt service, or conversion of debt to non-voting equity
Patrol boat, offshore supply boat construction	None	Planning new yard at new location
Sarawak gov't. boat repair	None	$15 mil loan for new yard (est. project cost is $23 mil), to include shiplift system

Yard	Facilities/Employees	Specialties	Target Market
Ironwoods Kuching	Two slipways (127 metre and 30 metres); machine shop; 77 employees	Small boat construction and repair	15 metre fishing boats, private small boat construction & repair
Eleven Shipyards * Sibu	Ten slipways from 500 to 2000 DWT capacity; 540 employees	Tugboats, small coastal ship construction & repair	Offshore workboats, other private sector work
Two Shipyards ** Miri	Two slipways; 80 employees	Tugboats, small coastal ships, barge construction & repair	Same
Sabah Shipyard Labuan	140 metre, 6970 ton syncrolift with transfer to building shop and two repair berths; cranes from 5 to 70 ton capacity; 700 employees	Construction of 5000-8000 DWT ships and quality tugboats, repair of ships to 14000 DWT	Multiple ship contracts, international market for construction & repair offshore modules

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* Sibu Shipyards:

- Ocean Shipyard
- Far East Shipyard
- Lee Bros
- Yong Choo Kuy
- Borneo Shipyard
- Chiong Bros.
- Hiap Thye
- Yong Hing
- Sing Kiong Hong
- Ngie Lee
- Nguong Mee

** Miri Shipyards:

- Nam Cheong
- Sarawak Slipway

Exhibit 3
(continued)
Malaysian Shipbuilding & Repair Industry

Industry Composition & Financing Requirements

ies	Target Market	IDB Involvement	Financing Requirements
struction	15 metre fishing boats, private small boat construction & repair	None	Want to improve repair capability and add construction workshop
ll coastal on & re-	Offshore workboats, other private sector work	Tug financing	Ocean Shipyard wants ship-lift, estimated cost $2.5-$7.5 mil
ll coastal nstruction	Same	None	Nam Cheong requires $1 mil to complete new 1000 ton slipway
of 5000- ships and its, repair 00 DWT	Multiple ship contracts, international market for construction & repair, offshore modules	(1) $5.7 mil ship bridging loan (2) $2.0 mil repair discounting facility	IDB must provide ship credit facility to enable multiple ship contract to be obtained -- estimated at $100 mil loan commitment for each 4 ship contract

PSC started in 1972 as a joint venture between IHC Holland, a leading mineral dredger manufacturer, and Penang Development Corporation. In 1976 the venture was restructured with local interests taking entire ownership.

(a) Facilities

The yard has two building ways. One is 150 meters, the other 120 meters. Fitting out is accomplished at a 300 meter wharf. Vessels up to 8,000 DWT can be built in this yard. Facilities include a production shop, seven support shops, mould loft and 5,000 sq. meters of open assembly area. There are nine mobile cranes including a 136 ton crawler and two 45 ton crawlers.

Two floating drydocks are in service for repair work on small vessels.

(b) Employees

Employment was 456 in mid-February. This is down from 587 employees in July 1982. Reduction in workforce has been through attrition. Of the current workforce, 315 are production workers, 101 are indirect employees.

(c) Specialties

The yard was originally set up to build IHC design dredgers. Facilities were laid out for such work. This is obviouisly a specialty unique to PSC.

Recently the yard has built nine fast patrol boats and seven tugboats. It has developed capability to make fibreglass craft. Various structures have been fabricated, including bucket ladder, anchor leg mooring, and floating pipeline.

(d) Target Market

PSC sees a mixture of sales opportunities in the offshore industry and public boat sector. It also sees opportunity to build small coastal vessels such as feederships and cement ships. There is interest in diversifying its fibreglass business to include industrial products such as small water tanks.

(e) Expansion Plans

PSC wants to add a graving dock capable of accommodating a 10,000 DWT ship. This graving dock would be located in a 3 hectore area created by fill. Supporting shops would be constructed in this new area. Management estimates $25 million needed for this project.

(f) Issues and Problems

Penang, according to PSC management, is not a ship repair center. The yard must rely on new construction for its principal source of business. Management is pursuing the same contracts other yards are pursuing. The yard is not close to the offshore

fields. It must compete with MSE and Hong Leong-Lurssen on patrol boat contracts. The two competitors appear to have more advanced building facilities for such boats. MSE has taken the recent dredger contracts, despite PSC's yard being set up for dredger construction. A major problem is PSC's ability to position itself in a market niche where the firm has unique strengths.

3. Hong Leong-Lurssen

HLL is a joint venture established in 1969. It is equally owned by Hong Leong Industries Bhd, Fr. Lurssen Werft, and Permodalan Nasional Bhd. The yard, located in Butterworth, opened in 1972.

(a) Facilities

Vessels are fully constructed under cover in a 125 meter shipbuilding shed. Subassemblies are made in a 120 meter prefabrication shed. Both sheds are equipped with overhead cranes with 8-16 ton lift capacity. Completed vessels are transferred to a 60 meter syncrolift with 700 ton lift capability for launching. Shops are equipped with an optical automatic flame cutting machine, 200 ton press, and extensive equipment for diesel engine overhaul and testing. The mechanical workshop is particularly impressive.

(b) Employees

Workforce in February was 340 employees. In 1978 there were 500 employees.

(c) Specialties

HLL was established to build and service high speed patrol boats. This is its specialty. The yard has completed 21 fast patrol boats. It has also built tugboats, landing craft, and assault boats. One 71 meter survey vessel has been built.

(d) Target Market

Management will continue to pursue the market for patrol boats, pilot launches and crewboats. HLL is also looking at the export market for fishing boats.

(e) Expansion Plans

There are no plans for expansion.

(f) Issues and Problems

HLL has market and technical problems. The firm faces severe competition from MSE in patrol boat construction. There is potential loss of repair business when the Malaysian Navy facility opens in Lumut. HLL sees its primary business base disappearing. Management states it would shift to other lines of business if gov-

ernment policy permitted long term planning. Cannot plan now because Treasury requires public boat contracts to be bid competitively, rather than negotitated with most qualified yard.

Being a private yard HLL has no special leverage within the government. "Cannot compete with MSE on patrol boats as MSE can bring leverage through Ministry of Public Enterprises."

There is a silting problem at the syncrolift platform. Lack of trained engineering staff limits the yard's capabilities. According to HLL, financing programs for export orders available through Bank Kemajuan are too restrictive.

HLL is a paradox. It has one of the country's best equipped facilities for high technology boat construction and repair. Management believes yard has proven capability. But the MSE and Lumut yards virtually make HLL redundant.

4. Malaysia Shipyard and Engineering

MSE opened in 1976. The yard was designed as a repair facility for large tankers trading from the Persian Gulf to Japan. It is 78 percent owned by the government, 10 percent by Sumitomo Heavy Industries, and 12 percent by Kuok Brothers and International Maritime Carriers. Occupying 163 acres, it is by world standards a major, modern shipyard.

(a) Facilities

There are two graving docks for repair work. Dock No. 1 can accommodate tankers to 400,000 DWT. Dock No. 2 is sized for tankers and other ships to 140,000 DWT. The repair facility has one 80 ton and four 15 ton cranes. There is one wet dock available for ULCC's, and two repair quays for ships to 150,000 DWT. Well-equipped workshops are in place to perform normal repairs and servicing.

The new construction facility consists of an assembly hall and supporting workshops. Completed vessels are transferred from the assembly shop by traverser system to a 38 meter, 400 ton shiplift for launching.

Engineering division facilities include 100,000 sq. meters of workshop space and a 110,000 sq. meter fabrication site. Assemblies weighing 1500 tons can be moved by skidding track from the fabrication yard to a special load out jetty for shipment. A 150 ton crawler crane is available in the fabrication yard. The new rolling stock assembly workshop (almost completed) is located on a separate 43 acre site with rail access.

(b) Employees

Total employment was 1800 employees in early 1984, divided among the three divisions as follows:

ship repair	900 employees
ship construction	500 "
engineering	300-400 "

In addition the yard relies on a subcontractor labor force of 400-600 workers.

(c) Specialties

MSE is the only Malaysian yard able to drydock big tankers. This is an obvious specialty for which the yard was originally designed. The shipbuilding division has developed a capability to build patrol boats, tugs and cutter suction dredgers. Engineering division has experience in construction heavy assemblies such as offshore steel structures, pressure vessels, and railway coaches.

(d) Target Market

Docking and repair of big tankers will continue to be aggressively pursued by repair division. The new construction and allied services division intends to obtain 18-20 percent of government public boat repairs and pursue regional sales of MSE-built cutter suction dredgers. Engineering division is targeting manufacture of conveyors and cranes to be procured for Malaysian ports. The engineering division also wants to construct production modules for offshore industry and obtain contracts in civil work projects.

(e) Expansion Plan

None at present

(f) Issues and Problems

MSE proposes capital restructuring to convert $173 million outstanding loans to redeemable preferred stock. Purpose is to re-

duce debt-equity gearing ratio and allow MSE to be more competitive in international tenders.

Market for VLCC/ULCC repairs continues to deteriorate. There are fewer big tankers passing Singapore and each tanker repair throws off less work as owners economize on maintenance. Nine new large drydocks have recently been placed in service on the P.G.-Japan trade route. As will be described in the following chapter, the MSE repair market offers dismal prospects.

Another problem is availability of qualified workers. Marine training in local universities is seriously lacking. Vocational schools are providing training not suited to industry. MSE management indicates there are not enough qualified Malaysians wanting to work in shipyards. Workers want to go and stay in Singapore.

5. Limbongan Timor Sdn. Berhad

LTSB is situated in Kuala Trengganu, on the east coast of Peninsula Malaysia. The yard was originally established in 1953 as a training institute. Its intent was to train local boat builders in modern methods of boat construction. The yard evolved into a commercial builder, initially of fishing boats and more recently wooden and steel patrol boats.

(a) Facilities

There are two marine railways, 100 meters and 80 meters long. The shorter slipway is covered. Workshops are equipped for wood milling, welding and pipe bending. A 15 ton mobile crane and two 25 ton overhead cranes are in service.

(b) Employees

The yard employs 200 staff. Of this, 150 are production workers, 50 are indirect. In past yard has had 250 employees.

(c) Specialties

LTSB specialized in wood and aluminum hull boats until two years ago. Yard has built 65 24.5 meter wooden trawlers and 28 14 meter wooden patrol boats. The aluminum hulls have largely been less than 18 meters. About 50 percent of sales volume is repair work.

(d) Target Market

The firm is pursuing the market for offshore vessels and patrol boats. A very recent arrangement with Dutch-Belgium Shipbuilders (DBS) of Holland is anticipated to provide technical capability for building larger, sophisticated boats. DBS has a special capability in fast patrol boat designs.

(e) Expansion Plan

The chairman of Mara, in announcing the DBS-LTSB cooperative arrangement, stated LTSB will expand to build and repair bigger boats. The yard has very little expansion capability at its present site, being blocked on each side by oil depots. Information provided during the consultant's visit indicated plans to relocate LTSB to a new site and use the present yard for fibreglass construction.

(f) Issues and Problems

Weather causes the yard to stop outside work for several months during the monsoon season. River draft limits access at times. Workshop and outfitting facilities are very limited. The yard has extensively subcontracted large portions of contracts due to its limited capabilities.

6. Brooke Dockyard and Engineering Works

This shipyard was established in 1912 to repair government vessels. It is a government-owned yard reporting to an appointed Board of Directors.

(a) Facilities

The yard has a 73 meter graving dock which can handle vessels to 1000 tons. A small marine railway can take vessels to 60 tons. A machine shop is available for repair support. New construction is performed at a separate fabrication yard at the Bintawa Industrial Estate.

(b) Employees

About 230 staff are employed. The number has been constant for the past several years.

(c) Specialties

Brooke repairs all Sarawak government vessels. This provides a captive market of 100 vessels annually. It also builds tugboats, barges, other small vessels, and small engineered products.

(d) Target Market

Brooke expects repair of government vessels will continue to be its business base. Management believes construction of government vessels and offshore supply boats will provide new construction prospects. There are plans to develop business in onshore structures, including steel bridges and transmission towers.

(e) Expansion Plans

Brooke proposes to develop a 36 acre new site at Sejingkat. The new yard is to be equipped principally for repair work, but have flexibility for new construction. A shiplift system able to handle 3000 DWT vessels is to be installed. Brooke estimates new facility will cost $23 million. Original consultant report projected expenditures of $65 million, but plans were scaled down to lower project cost.

(f) Issues and Problems

Brooke is in the enviable position of not being able to accommodate available repair demand. The yard is old and has become tightly boxed in at its Market Street site. It needs larger space.

Being a government yard Brooke management feel constrained by personnel rules which prevent lay offs of employees. Management also believes it has less pricing flexibility.

7. Ironwoods Shipyard

The yard started business in 1973. It is located in the Pending Industrial Estate on the Sarawak River. An area of 20 acres is occupied by the shipyard. It is privately owned by 40 shareholders.

(a) Facilities

There are two railways. The larger is 127 meters and can accommodate 2000 DWT vessels. The other railway is 30 meters and is used mainly for small patrol craft. A floating jetty is used for wet berth repair. Three cranes (one 35 ton, two 15 ton and one 5 ton) are in service. The workshop has basic welding and cutting equipment.

(b) Employees

Yard had 77 employees at time of visit. Workforce has exceeded 125 in past. About 40 percent are considered skilled workers. 30 percent are semi-skilled.

(c) Specialties

Ironwoods does mostly commercial work, equally divided between repair and new construction. Firm has built tugboats, a 38 meter cargo vessel and a 49 meter deck cargo barge. There appears to be a somewhat unique capability to perform conversion work.

(d) Target Market

The firm intends to continue to pursue commercial business repair and small vessel construction. Management believes a realistic sales target is 5-10 new boats over next ten years. Also sees potential local market for 15 meter steel fishing boats. "Could be market for 20 such boats annually."

(e) Expansion Plan

Ironwoods wants to improve its ship repair capability and add a new workshop.

(f) Issues and Problems

There is no proper training program for teaching shipyard skills. Management believes there is need for government program to train basic skills in welding, shipfitting, drafting, mechanical, marine diesels, and painting preparation and application. Yard has problem competing with Singapore yards because of duty on imported material: e.g., 40 percent duty must be paid on imported paint; bottle of oxygen 80 percent more expensive than in Singapore. Can take two weeks to obtain import permit.

8. Small Sarawak Shipyards

There are about 20 small shipyards in Sarawak. Over half are located in Sibu on the Rajang River. Sibu is the commercial and trading center for the Third Division of the State of Sarawak. The rest of the yards are located in Kuching, Miri, Bintulu and Limbang. The majority of the Sarawak small shipyards started business in the past 10-15 years.

Exhibit 4
Malaysian Shipbuilding & Repair Industry

Sarawak Shipyards

Yard	Facilities	Employees	Production History	Started Business
Sibu				
Ocean Shipyard	1 500 ton slipway, can build 5 boats over 500 T at one time	200 incl. sub-contractors	120, from express boat to 2000 DWT	1972
Far East Shipyard	2 yards, 4 slipways 1 1000T, 3 500T, could build 4-5 boats over 500 T at one time	70-80	less than 30 boats	pre WWII
Lee Bros Yong Choo Kuy Borneo Shipyard Chiong Bros.	building contractors, could build ship but have no maintenance capability; could build mixture of 40 small & mid-size ships in one year	20 each	each yard has built 30 vessels	Lee 1974 others 1979
Hiap Thye Yong Hing Ting Kiong Hong	1 1000T capacity slipway; can build 4-5 ships each per year	40-50 each	each has built 30-40 units	1972
Ngie Lee	1 500T slipway; no construction	40	no building	1965
Nguong Mee	1 2000T slipway; can build river tugboat up to 4-5 units per year	30	less than 10 boats	1980
Miri (river only 6-8 feet)				
Nam Cheong	1 800T slipway; can build up to 1500T ship, could build 3-4 units per year	40-50	40-50 vessels	around 1950 just sold for $1.5 mil.
Sarawak Slipway	same	---	---	---
Kuching				
Lai Ching Hing Swee Joo	each has 1 under 500T repair slipway, no new construction	20 each	none	1981
Bintulou				
Two Shipyards	each has 1 slipway for barge repair, can use for tug repair	20 each	none	1978
Limbang				
Sing Matu new yard	1 slipway for barge repair	20	none	1978 1984

(a) Facilities

As shown in Exhibit 4, most of the yards have capability to drydock small vessels. The larger railways can accommodate up to 2000 DWT vessels. Four yards are only capable of new construction, essentially fabricating vessels in an open lot. Workshop facilities at each yard are very marginal.

(b) Employees

An estimated 750 workers are employed in these shipyards.

(c) Specialties

These small yards are very effective in building small coastal vessels and tugboats, built to local classification requirements. One Sibu yard, Ocean Shipyard has built about 120 tugboats and small vessels. A river tug not built to classification society rules can be built profitably by the yard and sold for $200,000. This is an extremely low price.

(d) Target Market

Yards are focusing on building low to mid-complexity tugs and coastal cargo vessels.

(e) Expansion Plans

At least two yards have expansion plans. Ocean Shipyard in Sibu wants to add a shiplift for repairs. Management believes a simple shiplift would cost $2.5 million. Nam Cheong in Miri is

building a new slipway for 1000 ton vessels. Pilings are in place and grading has been completed. Need $1 million to complete project.

(f) Issues and Problems

Import taxes detract from ability to be competitive with Singapore. Facilities are marginal at all yards. Financing available in Singapore draws work away from Sarawak shipyards. Political factors affect ability to compete for government contracts.

9. Sabah Shipyard

This yard is located on a 35 acre site in Labuan. It started business in 1972. Initial activities were confined to small wooden vessels. Yard ownership was restructured in 1976 and new capital injected by the Sabah Government. A $105 million expansion program was started in 1980 to greatly improve the facility. Sabah Shipyard is now the second largest Malaysian commercial shipyard.

(a) Facilities

There is a 140 meter shiplift platform able to lift 6970 tons. A transfer system enables vessels to be moved from the shipbuilding hall for launching, or place ships on the two repair berths. Wet berth space for outfitting and afloat repairs is available for three mid-size vessels. Cranes ranging from 5 to 70 ton capacity are in service.

(b) Employees

The yard employs 700 workers. Another 700 workers are indirectly employed by the yard.

(c) Specialties

Sabah has cabability to build high quality ships in the 5,000-8,000 DWT size category. It has built four 113 meter, 8,000 DWT log carriers for Yayasan Sabah, who is quite satisfied with the quality of construction. The yard also has capability to build high quality tugs for the offshore industry. Its syncrolift with two repair berths is well-suited to repair of mid-size cargo ships.

(d) Target Market

Sabah management developed an initial five year plan calling for a mix of 50 percent new construction, 20 percent repair and 30 percent fabrication of engineered assemblies. This plan is now being reevaluated, with probability more emphasis will be placed on obtaining repair business. Management wants to develop export market for cargo vessels in 5,000-8,000 DWT category, emphasizing multiple ship contracts which enhance productivity. Does not want to rely on domestic sources for more than 50 percent of the yard's business. Management also plans to penetrate the market for offshore living modules.

(e) Expansion Plans

Management has no expansion plans. Yard is now about 50 percent utilized. Want to increase throughput to better utilize facilities.

(f) Issues and Problems

Sabah perceives its principal problem is lack of adequate government financing to enable entry into the export market. Management wants to compete for multiple ship contracts. Total sales price will be $120 million for a four-ship package. This requires financing or financing guarantees in the range of $100 million. Bank Kemajuan has policy, according to Sabah of limiting exposure to $20 million for anyone customer. This effectively prevents Sabah from competing with foreign shipyards who have access to such financing assistance from their governments. It would require Sabah to limit bids to single ship contracts requiring financing $20 million or less. The management says yard cannot be efficient fulfilling single ship contracts.

10. Lumut Naval Facility

A major ship repair yard is being built at Lumut for naval ship repair. The yard will be capable of handling five frigate size ships at one time. Plans for building this facility date from the mid-1960's. Construction began in the early 1970's. The yard is expected to be operating this November. It will initially employ 1,500 workers. A workforce of 2,000 is ultimately planned. Forty percent of the yard staff will be Navy personnel.

The Government has invested $580 in building this 64 acre facility. It is a much greater investment than MSE. Of the total investment, $340 million is for equipment, $240 million for buildings. Facilities include:

- o syncrolift able to lift 3,000 tons
- o shipbuilding shed
- o electronics shop able to fully service Navy needs
- o ordnance shop
- o engine repair shop
- o pipe shop
- o GRP construction workshop (biggest in Malaysia)
- o training school for 200 apprentices

Navy plans in 1985 to accommodate 50 percent of its repairs at Lumut. This percentage will gradually increase and other shipyards will be limited to overload business Lumut cannot handle. Navy typically has nine ships being repaired at any one time. According to Navy officials, Navy spends $40 million per year for ship repair. Loss of this business will be an important consideration for MSE and Hong Leong-Lurssen.

The question of whether the Lumut yard should be privatized is now being studied. Navy does not favor privatization. But government policy is to encourage such development. Privatization is a clearly stated strategy in the Mid Term Review. If the yard is privatized, it will attempt to move into commercial repair and construction. This would have major impact on existing yards. Lumut has an assured naval repair business. It can bid for commercial projects on an incremental cost basis. Other yards -- particularly MSE, Sabah and Penang -- would have great difficulty competing in these circumstances.

Navy's principal problem at Lumut is availability of skilled workers. It is estimated that 80 engineers will be needed to run the facility at full load. There are now 35 engineers, only two of which are naval architects.

II. Overall Financial Results and Potential

Shown in Exhibit 5 are the financial results for the past several years for each of the larger shipyards. These data indicate that shipbuilding and ship repair is a $300-400 million industry at present. It is not a very profitable industry. In fact, overall industry financial results are negative.

A rough estimate is that this could be a $700 million industry if operating at full potential. About half of this total potential is in MSE. Sabah accounts for another 20 percent of the total potential. The remaining 30 percent is spread about evenly over PSC, HLL and the small Sarawak yards.

Exhibit 5
Malaysian Shipbuilding & Repair Industry

Shipyard Financial Results

	Turnover (millions of $)		Profit (Loss) (millions of $)	
Penang	1981	$43.1	1981	$(4.0)
	1982	53.0	1982	1.0
	1983	37.7	1983	3.1
Hong Leong-Lurssen	1982	$21.3	1982	$6.0
	1983	37.4	1983	6.0
MSE	1981	$163.8	1981	$2.7
	1982	145.7	1982	(5.9)
	1983	152.4	1983	2.6
	1984	208.4 (proj.)	1984	1.1 (proj.)
Limbongan	1981	$7.4	1981	$(2.0)
	1982	(18.5)	1982	(3.0)
	1983	1.2	1983	(4.8)
Brooke	1981	$5.5	1981	$.5
	1982	19.5	1982	.7
	1983	4.6	1983	.3
	1984	11.0	1984	.5
Ironwoods	1981	$2.1	1981	$.2
	1982	1.8	1982	.7
	1983	2.4	1983	.4
Sibu	no data		no data	
Miri	no data		no data	
Sabah	1981	$30.9	1981	($9.9)
	1982	33.7	1982	(47.1)
	1983	46.7	1983	(57.6)
	1984	100.5 (proj.)	1984	8.7 (proj.)

IV. FUTURE MARKET PROSPECTS FOR MALAYSIAN SHIPYARDS

The market of relevance to Malaysian shipyards can be segmented into eight categories:

- o big tanker repairs
- o coastal trading vessels
- o offshore workboats
- o patrol boats and navy craft
- o Malaysian registry foreign trading ships
- o ship export market
- o offshore engineered assemblies
- o onshore engineered assemblies

Future prospects and competitive position in each of these segments is the subject of this chapter.

1. Big Tanker Repairs

MSE has an obvious problem. The yard is designed to drydock VLCC/ULCC's. Yet the number of big tankers in service has been decreasing and the number of competitive facilities has increased. Exhibits 6 through 11 tell the story.

Tankers returning from Japan to the Persian Gulf are the source of business for VLCC/ULCC repair yards in or near Singapore. It takes several days to gas free an empty tanker. This gas freeing must be done before repairing the ship. Tankers unloading in Japan can gas free on their return voyage to the Persian Gulf. By the time they reach Singapore they are gas free and can be immediately drydocked and repaired. This is why Singapore is a major center for VLCC/ULCC repair activity. It is also the reason Portugal has become a VLCC/ULCC repair center for tankers trading Persian Gulf-Northern Europe.

Oil imports in Japan grew from 1975 through 1979, after dropping somewhat following the 1973 oil price increases. From 1979 on, oil imports have decreased. Increased imports to Southeast Asia countries continued to grow, but not enough to offset the downturn in Japan's imports. These data are shown in Exhibit 6.

Exhibit 6
Malaysian Shipbuilding & Repair Industry

Trend In Oil Consumption In Japan And Southeast Asia
(000's of b/d)

Fiscal Year	Japan	Southeast Asia
1972	4,800	N.A.
1973	5,425	N.A.
1974	5,270	N.A.
1975	4,905	N.A.
1976	5,190	1,770
1977	5,350	1,915
1978	5,420	2,110
1979	5,495	2,345
1980	5,010	2,445
1981	4,700	2,480

Source: International Petroleum Encyclopedia, 1983

Projected oil demand in Japan is expected to grow very little through the mid-1980's. As shown in Exhibit 7, Japan's oil demand in 1987 is projected to be just slightly higher than 1984.

Exhibit 7
Malaysian Shipbuilding & Repair Industry

Projected Japanese Demand For Petroleum Products
(000's of kilolitres)

Fiscal Year	Total Demand	% of Previous Year
1981	194,508	93.0
1982	182,292	93.7
1983	175,242	96.1
1984	178,167	101.7
1985	180,435	101.3
1986	182,172	101.0
1987	183,794	100.9

Source: Petroleum Economist, Sept. 1983

The number of big tankers in service has been decreasing. From a 1979 peak of 758 tankers and combination carriers over 200,000 DWT, the number had fallen to 600 such ships in mid-1983. These data are shown in Exhibit 8.

Exhibit 8
Malaysian Shipbuilding & Repair Industry

Number of Ships Over 200,000 DWT In Service at Mid-year

	Tankers	Combi	Total
1973	319	19	338
1974	422	30	452
1975	538	32	570
1976	640	31	671
1977	701	32	733
1978	722	33	755
1979	725	33	758
1980	713	31	744
1981	689	30	719
1982	642	30	672
1983	572	28	600

Source: Fearnleys

Over the past three years the number of large tankers laid-up has drastically increased. As shown in Exhibit 9, almost 200 big ships were laid up as of mid-1983. And this number understates the situation. Many tankers were slow steaming or being used for floating oil storage.

The International Association of Independent Tanker Owners (INTERTANKO) reports that world ton-miles of crude oil transportation fell 27 percent in 1982 and 4 percent in 1983. INTERTANKO estimates that over half the present VLCC/ULCC fleet is surplus capacity.

Exhibit 9
Malaysian Shipbuilding & Repair Industry

Average Number of Ships Over 200,000 DWT Laid-up

Year	No. of Ships
1973	--
1974	--
1975	69
1976	65
1977	69
1978	87
1979	45
1980	24
1981	46
1982	129
1983	197

Source: Fearnleys

Exhibit 10 shows the trend in number of big tankers in service in the Persian Gulf-Far East trade. The number of ships grew from 1975 through 1981, then fell by 15-20 percent between 1981-1983. This shows the trend in the overall big tanker repair market available to MSE. It is a poor picture, but understates the problem. Not only has the number of big ships passing Singapore decreased, each ship when drydocked requires less work. Because of the glut of big ships and uncertain future prospects, owners are doing less preventive maintenance. Owners do not want to request work intended to extend a ship's life. The glut has changed the economics of preventive maintenance. One major tanker owner estimates that expenditure for a 2 1/2 year scheduled docking is now US $600-800,000. Expenditure during such docking in the past was US $1 million.

Exhibit 10
Malaysian Shipbuilding & Repair Industry

Number of Ships Over 200,000 DWT Engaged in One or More Trips in PG-Far East Trade

	Tankers	Combi	Total
1973	150	6	156
1974	179	10	189
1975	160	3	163
1976	207	4	211
1977	246	4	250
1978	241	5	246
1979	275	5	280
1980	301	--	301
1981	330	3	333
1982	N.A.	5	Est. 290/310
1983	N.A.	N.A.	Est. 260/290

Source: Fearnleys

To further aggravate the situation, over the past two years nine large drydocks were placed in service to repair VLCC/ULCC's trading between the Persian Gulf and the Far East (see Exhibit 11). Three of these new docks are in Dubai, one in Singapore, one in the Philippines, and four in Korea. There are now 29 big tanker docks on the PG-Far East route. Five of these docks are in Singapore. Assuming each big tanker is drydocked every two years, the 260-290 tankers operating on the PG-Far east route will create about 130-145 drydockings annually. This is an average of about five drydockings per facility. Excluding the Japanese yards, the average would be about nine drydockings per facility.

Exhibit 12 shows recent VLCC/ULCC repair activity at MSE compared with Singapore, Korean, Philippine and Japanese yards. During

Exhibit 11
Malaysian Shipbuilding & Repair Industry

Drydocking Facilities for 200,000 DWT And Larger Tankers In PG-Far East Trade

Yard	Location	Drydocks	Dimensions	Notes
ASRY	Bahrain	1 500,000 DWT	375 x 75	yard opened 1977
Dubai	UAE	1 350,000 DWT	370 x 66	yard opened 1983
		1 500,000 DWT	415 x 80	
		1 1,000,000 DWT	525 x 100	
Keppel	Singapore	1 330,000 DWT	355 x 60	dock in service 1982
Jurong	Singapore	1 300,000 DWT	350 x 56	in service pre 1975
Sembawang	Singapore	1 400,000 DWT	384 x 64	in service pre 1975
Hitachi Robin	Singapore	1 300,000 DWT	350 x 60	in service pre 1975
MSHI	Singapore	1 400,000 DWT	380 x 80	yard opened 1976
MSE	Malaysia	1 400,000 DWT	385 x 80	yard opened 1976
Philseco	Philippines	1 300,000 DWT	350 x 65	yard opened 1982
CSBC	Taiwan	1 1,000,000 DWT	380 x 92 1/	yard opened 1976
DAEWOO	Korea	1 350,000 DWT	350 x 81	dock in service 1983
Hyundai Mipo	Korea	1 300,000 DWT	330 x 65	repair yard est. 1975.
		3 400,000 DWT	380 x 65	new docks in service 1982
IHI Aioi	Japan	1 300,000 DWT	340 x 56	in service pre 1975
Koyo	Japan	1 300,000 DWT	350 x 56	in service pre 1975
MHI Nagasaki	Japan	1 300,000 DWT	335 x 56	in service pre 1975
		1 500,000 DWT	390 x 100	in service pre 1975
Tsuneishi	Japan	1 200,000 DWT	330 x 53	in service pre 1975
Hitachi Sakai	Japan	1 400,000 DWT	380 x 62	in service pre 1975
KHI Sakaide	Japan	1 500,000 DWT	450 x 72	in service pre 1975
Sasebo	Japan	1 400,000 DWT	370 x 70	in service pre 1975
IHI Yokohama	Japan	1 320,000 DWT	355 x 56	in service pre 1975
Mitsui Yura	Japan	1 330,000 DWT	350 x 65	in service pre 1975
NKK Tsu	Japan	1 500,000 DWT	500 x 75	in service pre 1975
MHI Yokohama	Japan	1 400,000 DWT	350 x 60	in service pre 1975

1/ 950 m three section dock with 380 m available for repair

Source: Bureau Veritas, Docking Facilities for Ships Over 200,000 DWT, 1975 updated by Motor Ship, Worldwide Shiprepair Facilities, 1983.

Mala

Two Y

(in

Period	MSE		Jurong		Hitachi Robin		MSHI Singapore		Keppel Singapor	
	No. Jobs	Days of Work	No. Jobs	Days of Work	No. Jobs	Days of Work	No. Jobs	Days of Work	No. Jobs	Day of Wor
Nov. 81-Jan 82	0	0	5	104	5	166	6	190	- no data -	
Feb 82-Apr 82	2	43	7	no data	3	35	4	61	1	
May 82-July 82	2	28	3	no data	5	85	3	53	5	no dat
Aug 82-Oct 82	3	36	1	no data	1	14	1	9	3	
Nov. 81-Oct. 82 Total	7		16		14		14		--	
Nov. 82-Jan 83	1	no data	0	0	2	21	1	30	2	
Feb. 83-Apr 83	2	37	2	23	2	28	2	58	2	
May 83-July 83	2	no data	3	59	6	85	3	no data	2	
Aug. 83-Oct. 83	3	no data	2	23	4	67	3	no data	1	
Nov. 82-Oct. 83 Total	8		7		14		9		7	
Two Year Total	15		23		28		23		--	

Source: Drydock, VLCC Repair Statistics (Sembawang does not provide information to publishers and is not

SECTION 1

Exhibit 12
Malaysian Shipbuilding & Repair Industry

Two Year Record of VLCC/ULCC Repairs
By Shipyard Performing Work
(includes ships over 175,000 DWT)

MSHI Singapore		Keppel Singapore		Hyundai Mipo		Philseco		IHI Japan	
No. Jobs	Days of Work	No. Jobs	Days of Work	No. Jobs	Days of Work	No. Jobs	Days of Work	No. Jobs	Days of Work
6	190	- no data -		1	35	- no data -		- no data -	
4	61	1	9	6	119	- no data -		- no data -	
3	53	5	no data	3	87	- no data -		- no data -	
1	9	3	82	2	56	- no data -		- no data -	
14		--		12					
1	30	2	62	1	4	- no data -		- no data -	
2	58	2	65	4	85	- no data -		2	20
3	no data	2	90	3	49	- no data -		6	91
3	no data	1	37	2	69	1	18	7	99
9		7		10		--		--	
23		--		22		--		--	

information to publishers and is not included in tabulation).

late 1981-1982, MSE had fewer jobs than its Singapore competitors. But in the most recent year, in terms of number of jobs, MSE has appeared to keep pace with other yards. These data, of course, are only rough measures of activity and do not indicate magnitude of work associated with each job.

We interviewed a major tanker owner who had recent experience with MSE. The owner stated MSE is equal to its competitors in price, turnaround time, reliability and quality of workmanship. However, the owner vividly described the cutthroat competition for VLCC/ULCC repair work. To compete, MSE must offer very low prices.

1984 and the next several years do not offer much prospect for VLCC/ULCC work at MSE. The number of ships is decreasing, work during each repair is down, and competition has increased. Prices to obtain jobs will have to be very low. MSE's loss of $12.1 million in ship repairing in 1983 may be exceeded over each of the next several years due to these market conditions.

2. Coastal Trading Vessels

As stated in the Introduction, limited data are available about the coastal fleet.

Based on Ministry of Transport data there were 620 ships in the Malaysian shipping fleet in 1983. Removing 35 MISC, 5 PNSL and 7 Yayasan Sabah ships employed in foreign trading, the domestic coastal fleet appears to be more than 550 vesseis.

The number of ships in the Malaysian fleet has increased about 50 percent over the past two years, as shown in Exhibit 13. This is the result

Exhibit 13
Malaysian Shipbuilding & Repair Industry

Malaysian Shipping Fleet: 1971-1983

Tahun	Pelabuhan Kelang		Pulau Pinang		Sabah		Sarawak		Jumlah Besar	
	Jumlah Kapal	GRT	Jumlah Kapal	GRT	Jumlah Kapal	GRT	Jumlah Kapal	GRT	Jumlah Kapal	GRT
1971	--	--	150	75,871	--	--	3	1,220	153	77,091
1972	--	--	154	178,606	7	3,413	6	2,717	167	184,736
1973	--	--	149	179,954	13	4,537	9	3,925	171	188,416
1974	--	--	157	314,297	20	12,548	15	5,841	192	332,686
1975	--	--	182	360,550	24	14,870	17	6,593	223	382,013
1976	--	--	204	477,495	38	27,568	26	10,339	268	515,402
1977	--	--	204	480,505	56	47,233	27	11,264	287	538,992
1978	--	--	200	490,137	73	75,260	30	13,333	303	578,730
1979	--	--	194	488,276	81	82,625	34	17,519	309	588,420
1980	--	--	200	582,411	96	113,407	41	25,274	337	721,092
1981	--	--	238	614,232	112	128,523	65	42,469	415	758,224
1982	--	--	292	776,000	131	146,664	81	57,977	504	980,641
1983	7	14,753	338	1,297,917	147	166,321	128	143,639	620	1,622,630

Source: Pejabat-Pejabat Pendaftar Kapal.

of the government's new cabotage policy requiring domestic trading ships to be Malaysian registered and owned. The increase is somewhat misleading because many of the added vessels had been operating in the Malaysian coastal trade but registered in Singapore. Other vessels may be in these figures which are now registered in Malaysia for tax reasons, but not operating in the coastal trade.

Exhibit 14 shows the trend in cargo throughput by type of cargo over the past four years. These data include both Malaysian domestic and foreign trade. The greatest growth has taken place in general cargo.

Exhibit 14
Malaysian Shipbuilding & Ship Repair Industry

Composition of Malaysian Port Cargo Throughput 1980-83
(000's of tons)

	1980	1983	Annual Rate Of Growth (percent)
General Cargo	7,339	11,502	16.2
Containerized Cargo	1,771	2,445	11.4
Liquid Bulk Cargo	5,736	9,776	19.5
Dry Bulk Cargo	2,087	2,966	12.4
Total	16,933	26,689	16.4

Source: Mid Term Review

During the past three years, $1.1 billion has been expended on port development in Malaysia. This includes port improvements at Bintulu, Kuantan, Johor, Trengganu, Kelang and Penang. Total handling capacity of Malaysian ports is estimated to have increased from 26.3 million tons in 1980 to 41.9 million tons in 1983.

Vessel arrival data shown in Exhibits 15, 16 and 17 indicate that coastal traffic has increased since 1980. A very large increase in coastal ship traffic appears to have occurred in Peninsula Malaysia ports during the past year (see Exhibit 15). Vessel arrivals at Sabah ports (which include foreign and coastal vessels) have also grown during the past several years. Coastal vessel arrivals in Kuching appear to have declined. (See Exhibits 16 and 17.)

Exhibit 15
Malaysian Shipbuilding & Repair Industry

Arrivals of Vessels Engaged in Malaysian Coastal Trade
(Peninsular Malaysia)

	Vessels 75 NRT & Over		Vessels Less Than 75 NRT		Native Craft	
	No. of Arrivals	Index 1978 = 100	No. of Arrivals	Index 1978 = 100	No. of Arrivals	Index 1978 = 100
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	109
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	108
1982	6,912	111	13,552	79	13,599	147
1983 (est)	[illegible]	165	15,068	86	[illegible]	162

Source: [illegible] Peninsula Malaysia 1983 estimate based on extrapolation of average for first eight months of 1983.

Exhibit 16
[illegible]

Arrivals of Vessels at Sabah Ports
[illegible]

	Vessels 75 NRT & Over		Vessels Less Than 75 NRT	
	No. of Arrivals	Index 1978 = 100	No. of Arrivals	Index 1978 = 100
[illegible]	[illegible]	87	[illegible]	[illegible]
[illegible]	[illegible]	82	[illegible]	124
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	93	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	1,440	[illegible]
[illegible]	[illegible]	[illegible]	1,227	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Exhibit 17
Malaysian Shipbuilding & Repair Industry

Arrivals of Vessels at Port of Kuching
(vessels over 75 NRT)

	Vessels Engaged in Foreign Trade		Vessels Engaged in Coastal Trade
	No. of Arrivals	Index 1978 = 100	No. of Arrivals
1973	753	69	N.A.
1974	719	66	N.A.
1975	930	85	N.A.
1976	930	85	N.A.
1977	917	84	N.A.
1978	1,092	100	N.A.
1979	1,218	112	N.A.
1980	1,310	120	429
1981	1,546	142	1,019
1982	1,633	150	552

N.A. Not available
Source: Transport Statistics Malaysia, 1982; Coastal trade includes trade to Singapore.

While no consistent data base is available and the accuracy of some data can be questioned, it would seem that the coastal trade has been growing.

The fleet carrying this trade is rather old. At end 1981, 27 percent of the Malaysian fleet (in number of ships) was less than 10 years old. Another 30 percent were between 10 and 20 years of age. The remaining 43 percent exceeded 20 years of age.

Over the next two years total cargo tonnage through Malaysian ports is predicted to increase at 16.5 percent annually. Containerized cargo is projected to increase at an annual rate of almost 25 percent.

Several important port improvement projects will be completed over the next two years. They include channel improvements at Port Kelang, an additional berth in Penang Port, the Phase II expansion of Johor Port, and Phase I development of the Kuantan Port commercial complex. Projects to be initiated include expansion of Kota Kinabalu and Sandakan ports, and Phase II expansion of Kuching Port.

Taking all of these factors into account, namely:

- o there are about 550 coastal vessels operating in Malaysian coastal trade
- o the coastal trade appears to be growing
- o the fleet is old
- o port tonnage throughput is projected to grow over the next several years
- o significant port improvements have been completed or are planned

it would seem the coastal fleet will produce significant requirements for replacement tonnage over the next 5-10 years.

However, it should be recognized that an in-depth study is needed to make an accurate projection of coastal shipping requirements. This study would examine how many ships and what type would be required if the domestic transport system was optimized -- not just the number of ships required under present circumstances. Coastal shipping competes with road and rail transport. A modal split study would establish the economical role of each transport mode. When completed it will be possible to project the number of vessels which <u>should</u> be in the coastal fleet.

3. Offshore Workboats

There are 15 producing oil fields and two producing gas fields offshore East Malaysia. An additional 14 oil fields and 19 gas fields are being developed. Offshore Peninsula Malaysia there are six producing oil fields and eight under development. Twenty gas fields are also being developed offshore Peninsula Malaysia. These fields are shown in Exhibit 18.

Petronas estimates there are now about 15 workboats servicing the oilfields offshore Trengganu, and more than 20 workboats servicing the fields off Sarawak and Sabah.

Petronas has estimated that Shell and EPMI will each add at least one platform per year over the next several years. Published data for Shell show plans for 38 new platforms over the next 15 years off East Malaysia.

Field	No. of Platforms Planned by Shell
South Furious	4
Bakau	2
F-6 Field	3-4
Baronia	10
Betty	2
Temana	10
Tukau	2
West Lutong	5

Corresponding planning figures are not published for Esso Production Malaysia (EPMI), but the firm is studying platform requirements in the Tapis, Bekok and Tembungo fields.

A recent regional projection is that 85 offshore platforms will be installed in Asia-Pacific during 1984. 80 more are planned in 1985.

Exhibit 18
Malaysian Shipbuilding & Ship Repair Industry

Offshore Oil and Gas Fields

	Peninsula Malaysia	Sarawak	Sabah
Production:			
Oil	6	9	6
Gas	0	2	
Development and Predevelopment:			
Oil	8	10	4
Gas	20	16	3

Source: Mid Term Review

Assuming one workboat can supply two platforms, the additional platforms in Asia-Pacific will require 40 added workboats in each of the next two years. One additional workboat will be needed each year to service the planned Shell and EPMI platforms offshore East Malaysia. To this is added the number of replacement boats needed as the present fleet ages.

Offshore Malaysia there were 10 drilling rigs in operation as of last January. A total of 47 rigs had working contracts in Southeast Asia. Assuming 2 workboats are needed for each rig, 20 boats are required for exploration off Malaysia and almost 100 are needed regionally.

These data are very approximate. But, taken with government plans to

- o increase from 1 percent to 43 percent by 1990 the percentage of Malaysian total energy needs supplied by gas
- o increase oil production about 20 percent by 1985

they indicate there is a continuing regional and domestic market for new workboats which could be a source of business for Malaysian yards.

4. Patrol Boats and Navy Craft

According to published data there are 171 ships, patrol boats and small craft operated by the Malaysian Navy, marine police and customs service. A listing of these vessels is shown in Exhibit 19.

These vessels are an obvious source of repair business to the local shipyards. According to Navy officials, nine Navy ships are being repaired or overhauled at any one time. The annual Navy repair budget is $40 million. Assuming two year servicing intervals, this fleet should generate 85 drydocking jobs annually.

However, the new Navy facility at Lumut will drastically affect this market. This facility will deeply cut into the potential market of the existing yards. As stated previously, Navy expects to do most of its repairs at Lumut -- using other yards for only overload work.

As for new construction, several orders are pending for new patrol boats. Bids have been submitted by various yards for 18 PC patrol boats and 40 PA patrol boats for the marine police. MSE is to build one offshore patrol boat, involving technology transfer from Korea Shipbuilding and Eng. Corp. LTSB just received an order for 160 5.4 meter aluminum assault boats for the Malaysian Army.

The future of this market depends on national security considerations and budget constraints. It appears that budget constraints could force delay in contracting for the PC and PA patrol boats.

Exhibit 19

Inventory of Malaysian Navy, Marine Police, and Customs Service Vessels

Ship Type	No. of Vessels	Dimensions	Year Built	Construction Yard	Engines
Navy					
[illegible]	2	93.0 x 11.0 x 3.5	under const.	Howaldtswerke, [illegible]	[illegible]
Frigate	1	93.0 x 10.4 x 3.?	1967	Yarrow, Scotstown (refit at [illegible] in 1981-82)	[illegible]
Frigate	1	103.4 x 12.2 x 4.8	1966	Yarrow, Glasgow (refit in Singapore in 1981-82)	Admiralty Standard [illegible]
Missile Patrol Boat	4	43.6 x 7.0 x 2.5	1977	Karlskrona Varvet, Sweden	[illegible]
Missile Patrol Boat	4	47.0 x 7.? x 2.5	1972	CMN, Cherbourg, France	[illegible]
Offshore Patrol Boat	2	no data	on order	(1) [illegible], S. Korea (2) [illegible]	[illegible]
Patrol Boat	[illegible]	29.0 x ... x ...		PSC	[illegible]
Patrol Boat	6	44.9 x 7.0 x 2.5	1976-77	Hong Leong-Lurssen	[illegible]
Patrol Boat	22	31.4 x 6.0 x 1.7	1962-67	Vosper, Portsmouth England	[illegible]
Minehunters	4	50.0 x 9.6 x 2.6	under const.	Intermarine, La Spezia, Italy	[illegible]
Minesweepers	2	46.3 x 8.8 x 2.5	1955	Harland & Wolff (refit at Vosper Singapore in 1972-73)	[illegible] Deltic
Landing Craft	5	17.1 x 4.5 x 1.2	1970 transferred	Australia	[illegible]
Landing Craft	[illegible]	15.0 x 4.? x ...	[illegible]	Hong Leong-Lurssen	[illegible]
Landing Craft	[illegible]	14.6 x 4.3 x 1.0	1965-66 transferred	Australia	[illegible]
Hydrographic Ship	1	70.0 x 13.0 x 4.0	1977	Hong Leong-Lurssen	[illegible]
Support Ship	1	100.0 x 15.0 x 4.8	[illegible] 1980 2 on order	Bremer Vulcan, W. Germany	[illegible]
Tank Landing Ship	1	100.0 x 15.2 x 4.3	[illegible]	USA	[illegible]
Utility Landing Craft	2	48.6 x 10.3 x ...	[illegible]	PSC	Caterpillar
Utility Landing Craft	2	38.0 x ... x 1.4	1977	Brooke	Caterpillar
Utility Landing Craft	[illegible]	50.0 x ... x 1.5	[illegible]	Brooke	Caterpillar
Diving Tender	[illegible]	33.0 x 6.3 x 1.7	[illegible]	Singapore	[illegible]
Harbor Tugs	3	26.0 x ... x ...	[illegible]	Ironwoods	[illegible]
Other craft	[illegible]				
Marine Police					
[illegible] Patrol Boats	[illegible]	38.5 x 7.? x 2.2	[illegible]	Hong Leong-Lurssen	[illegible]
[illegible] Patrol Boats	[illegible]	28.0 x 5.? x 1.6	[illegible]	Hong Leong-Lurssen	[illegible]
[illegible] Patrol Boats	6	[illegible]	[illegible]	Vosper Singapore	[illegible]
[illegible] Patrol Boats	[illegible]	[illegible]	[illegible]	Vosper Singapore	[illegible]
Customs Service					
Patrol Boats	[illegible]	[illegible] x 6.0 x 2.0	1982-83	PSC	[illegible]
Sabah State Government					
[illegible] Boats	2	[illegible] x 0.9	1975	Cheverton, Isle of Wight	[illegible]
Patrol Boats	2	26.? x 5.7 x 1.5	1970	Vosper Singapore	Mercedes
Boat	1	27.3 x 5.5 x 1.7	[illegible]	Vosper Singapore	[illegible]
Utility Landing Craft	1	... x ... x ...	[illegible]	Chong Wah, [illegible]	Caterpillar
Total	[illegible]				

Source: [illegible] Fleets of the World, [illegible]

5. Malaysian Registry Foreign Trading Ships

The three major Malaysian ship operators, MISC, PNSL and Yayasan Sabah operate 47 Malaysian flag ships in foreign trade.

Company	No. of Foreign Trading Ships
MISC	35
PNSL	5
Yayasan Sabah	16 (9 foreign flag)

Only one of these owners. Yayasan Sabah has built ships in domestic shipyards. Four 8,000 DWT log carriers have been built at Sabah Shipyard. Yayasan Sabah had originally planned to build three ships in Japan and 12 ships at Sabah Shipyard but stopped mid-way through the second of a three phase expansion program. According to Yayasan Sabah, the domestic shipyard's price ended up 40 percent higher than the price in Japan. The first three ships in the expansion program were built in Japan for $9 million each. Sabah Shipyard's price eventually reached $15-17 million. Quality of construction was comparable to the Japanese yard, but Sabah Shipyard fell behind schedule on the third and fourth ship. Yayasan Sabah has no present plans for further ship construction.

MISC had plans to expand its fleet from 45 to 70 ships by 1990. But because of the company's 1982/83 financial results, these plans have been shelved for the present. The Mid Term Review states the MISC fleet will remain at 45 ships through 1984-85.

PNSL is building two 64,000 DWT bulk carriers in Korea and an LPG ship in Japan. The firm is planning to order two 6-10,000 DWT cement carriers to operate in domestic service between Langkawi and Kelang. These ships could be built at Sabah Shipyard, possibly PSC. There are also plans to acquire two passenger ferries for East-West Malaysia service. Presently it is planned that secondhand ships will be purchased, rather than new construction.

Several commodity export markets should create demand for additional shipping tonnage. Increases over the next several years are projected in exports of cocoa, palm oil, crude oil and rubber. This is shown in Exhibit 20. The additional shipping requirements for these commodities, over which the government has some control, could be met by locally built ships.

Exhibit 20
Malaysian Shipbuilding & Ship Repair Industry

Projected Commodity Export Increases

	1983	1984	1985
Cocoa (000 kg)	56,069	69,300	78,500
Palm Oil (000 tons)	2,913	2,952	3,347
Crude Oil (000 tons)	14,224	16,748	16,748
Rubber (000 tons)	1,563	1,560	1,600

Source: Mid Term Review

Several major plants planned or under construction will produce requirements for ships. The sponge iron plants in Sabah and Trengganu, for example, could require specialized ships to supply overseas market. However, imposing requirement to use Malaysian-built ships must be very carefully applied. These plants must be competitive in overseas markets. If

higher transport cost results because ships must be purchased (or repaired) locally, the plants may lose their competitiveness.

There will be added requirements for regional trading feeder containerships as containerization spreads in Malaysia. These ships are within the size range of Sabah Shipyard and possibly Penang Shipbuilding.

6. Ship Export Market

This market should be divided into two sections: repair of foreign registry ships and construction of ships for foreign owners. The repair market should be further divided between East and West Malaysia, as the former is much less influenced by the large Singapore repair base.

Repair potential in West Malaysia for big tankers has been previously addressed. But beyond big tanker repairs is a very large market for voyage repairs, scheduled drydocking and emergency drydockings for all types of ships. Exhibit 21 shows the trend in ship arrivals in Peninsula Malaysia, Sarawak and Sabah. Ship arrivals is a good indicator of the potential repair market. These arrivals show the number of potential customers for nearby repair yards. As the data indicate, ship arrivals over the past thirteen years have more than doubled in Peninsula Malaysia and tripled in Sarawak. A shorter time series is available for Sabah, but the data show more than 20 percent growth in ship arrivals over the past seven years.

Exhibit 21
Malaysian Shipbuilding & Repair Industry

Trend in Ship Arrivals by Geographical Area
(vessels over 75 NRT in foreign and coastal trade)

	Peninsula Malaysia		Sarawak		Sabah	
	No. of Arrivals	Index 1978 = 100	No. of Arrivals	Index 1978 = 100	No. of Arrivals	Index 1978 = 100
1971	8,228	69	52?	48	--	--
1972	[illegible]	[illegible]	90?	[illegible]	--	--
1973	7,866	66	753	69	--	--
1974	8,37?	70	71?	66	-	--
1975	9,041	76	930	85	—	--
1976	9,628	81	930	85	4,016	[illegible]
1977	10,796	90	917	84	3,852	[illegible]
1978	11,931	100	1,092	100	4,723	100
1979	13,155	110	1,218	112	4,37?	[illegible]
1980	11,500	96	1,310	120	3,92?	[illegible]
1981	12,001	101	1,546	142	4,321	[illegible]
1982	13,49?	113	1,633	150	4,86?	[illegible]
1983	[illegible] est*	141	— no data —			

*Notes: [illegible]

Source: [illegible]

More detailed data for Peninsula Malaysia are shown in Exhibit 22. These data show foreign arrivals in specific ports. They indicate most growth has occurred in peninsula ports other than Kelang and Penang. Penang and Kelang ship arrivals trends have been rather flat over the past five years.

The West Malaysian yards must compete with Singapore for obtaining repair work. MSE in particular has very little insulation. This is very difficult. Singapore has an established infrastructure and owners perceive that it is cheaper and quicker to repair in Singapore. Bringing a ship into MSE for repair requires extra maneuvering time. But MSE has the capability to handle a full range of repairs and the market is obviously big.

	Port of Kelang		Port of Penang	
	No. of Arrivals	Index 1978 = 100	No. of Arrivals	Index 1978 = 100
1973	2,440	82	1,739	90
1974	2,495	84	1,729	90
1975	2,749	92	1,753	91
1976	2,794	94	1,916	100
1977	2,851	96	1,985	103
1978	2,978	100	1,923	100
1979	2,794	94	1,711	89
1980	2,785	94	1,805	94
1981	2,899	97	1,900	99
1982	3,061	103	2,021	105

Source: Transport Statistics Malaysia, 1982

Exhibit 22
Malaysian Shipbuilding & Repair Industry

Arrivals of Vessels Engaged in Malaysian Foreign Trade
(Peninsula Malaysia)

Other Ports		All Ports	
No. of Arrivals	Index 1978 = 100	No. of Arrivals	Index 1978 = 100
666	81	4,845	85
640	78	4,864	85
696	85	5,198	91
707	86	5,417	95
889	108	5,725	100
820	100	5,721	100
851	104	5,419	95
1,021	125	5,611	98
1,162	142	5,961	104
1,500	183	6,582	115

East Malaysia yards also must compete with Singapore. But the distance factor is important, particularly if an emergency repair must be performed. Sabah Shipyard indicates there are 1,500 ships between 2,500-14,000 DWT that make two or more port calls annually in Malaysia. The shipyard sees these ships as its potential customer base. Yayasan Sabah reports that 300 6,000-8,000 DWT log carriers operate in East Malaysia trade.

A recent directive by the Chief Minister in Sabah requires all ships beneficially-owned by Malaysians (60 ships) must repair in Malaysian yards. The ship operator must obtain certificate issued by a Malaysian yard in order to load cargo. This is one (drastic) way to increase Malaysian yard penetration in the scheduled repair business.

In new construction there are very slight near term prospects for obtaining export contracts. Sabah Shipyard intends to pursue such orders, particularly trying to find buyers in Islamic countries. But to compete with Korean and Japanese shipyards who have tremendous sunk costs in massive shipyard investments is virtually impossible. That is, it is impossible unless the Malaysian government is willing to provide financing support to permit Sabah Shipyard to compete with Korean and Japanese yards. This would be a major financial commitment with much risk.

Overall it would seem that the export market for ship repair has reasonable potential. West Malaysia yards have a larger customer base, but more competition than the East Malaysian yards. Both Sabah Shipyard and MSE should be able to expand their penetration in export repairs. But the export of new ships will place Malaysian yards in competition with aggres-

sive, hungry Korean and Japanese yards. Success will require a strong commitment by the Malaysian Government and much financial exposure.

7. Offshore Engineered Assemblies

Malaysia plans to increase its offshore oil and gas production. Oil reserves are estimated to be 2.3 billion barrels with a 50 percent chance another 1.2 billion barrels will be discovered. Exploration and development of fields off Trengganu is now underway. Shell plans to add 38 platforms over the next 15 years. Esso is studying its requirements and is already approved to install gas production facilities in the Sotong field acreage off the Peninsula east coast. Regionally, more than 160 platforms are projected to be placed in service in Asia-Pacific over the next two years.

MSE and Sabah are interested in this market. MSE has already made significant penetration. The yard has fabricated 21 offshore living modules, helidecks and structures for Shell, Esso and Petronas.

Both yards can find opportunities in the offshore market. MSE can expand into production modules. Each platform typically has seven to ten topside production modules, and two accommodation modules. This will be further addressed in the next chapter. Sabah could also expand in module fabrication, starting perhaps with living quarters. Some changes would probably be required in Sabah yard facilities to handle module fabrication and shipment.

Another aspect to this market sector is repair of rigs. Sembawang in Singapore, for example, appears to have penetrated this market. There seems to be no reason why MSE (perhaps Sabah) could not enter this business. A major rig servicing can easily produce more revenue than a VLCC scheduled docking.

8. Onshore Engineered Assemblies

Numerous industrial and civil projects are planned which offer market opportunity to shipyards such as MSE, Sabah and PSC. These yards -- particularly MSE -- have capability to fabricate and ship large assemblies. MSE has already fabricated steel storage tanks, industrial facilities, crane girders, railway coaches. Sabah has fabricated span bridges and industrial plant equipment. PSC has made steel structures and industrial plant equipment.

Projected investments in heavy industries (cement plant, sponge iron plant, etc.) will create demand for a variety of intermediate level plant installations, notably:

- o heavy structural subassemblies
- o material handling systems (conveyors, cranes)
- o water treatment plant
- o plate products (pressure vessels, boilers)
- o dust collectors
- o electrostatic precipitators
- o large fans and ventilators

There is no basic reason why shipyards like MSE cannot handle all or most of this fabrication work. However, to achieve production efficiency and to accommodate special skills and know how, some specialization will be necessary.

9. Market Summary

Each of the eight segments offer varying degrees of potential, affect each yard differently, and involve government in different ways.

Exhibit 23 attempts to summarize the situation. Big tanker repair is a losing proposition. There are too many graving docks competing in a shrinking market. The market is wildly glutted and VLCC/ULCC repairs should be treated as a contributor to MSE's overhead. Government could possibly use leverage to encourage certain shipowners to repair tankers at MSE.

Exhibit 23
Malaysian Shipbuilding & Ship Repair Industry

Characteristics of Eight Market Segments

Segment	Type Work	Importance to Industry	Yards Affected	Growth Potential	Gov't. Assistance Needed
Big Tankers	Repairs	High	MSE	None	Leverage
Coastal Trading Vessels	Const., Repair	Medium To High	PSC, Sarawak Yds., Sabah	Medium	Protection
Offshore Workboats	Const., Repair	High	Sabah, LTSB, MSE, Sarawak Yds.	High	Leverage
Patrol Boats & Navy Craft	Const., Repair	Short Term High, Long Term Medium	MSE, HLL, LTSB	Medium	Funding
Malaysian Registry Foreign Trade Ships	Const., Repair	Medium To High	Sabah, PSC	Medium	Protection
Ship Export Market	a. Const., b. Repair	High High	Sabah MSE, Sabah, PSC	Low Medium	Heavy Financing Protection
Offshore Engineered Assemblies	Const.	High	MSE, Sabah	Very High	Leverage
Onshore Engineered Assemblies	Const.	High	MSE, Sabah, PSC	High	Leverage

Coastal vessels will provide construction and repair potential for several yards, but government must provide protection for domestic yards to participate.

Offshore workboats is a potential growth market which will impact many yards. Government's role is to place pressure on oil companies to buy and repair workboats in Malaysia.

Patrol boats can provide immediate relief to several yards if government funds projects already tendered. Over the long term this market will be less important.

Certain types of Malaysian international trading ships can be built at Sabah and PSC. Prospects will be enhanced if government makes domestic construction a policy.

The major yards have prospect of repairing international trading ships. Prospects are improved with government policy directives tieing domestic repair to Malaysian exports. Entry into international construction market is another story. This requires extensive government financing assistance.

The offshore market provides very attractive potential for module production, primarily involving MSE. Likewise the onshore market for engineered assemblies offer good market opportunity. Government can assist in both areas by applying leverage over contractors to place orders in Malaysian yards.

V. REGIONAL SHIPBUILDING DEVELOPMENTS

Malaysian shipyards are experiencing a problem common to many shipyards in other countries. They do not have adequate business. This is a problem to virtually every shipyard in the region.

1. Singapore

The shipbuilding and repair industry in Singapore employs 30,000 workers. In 1981 it contributed 6 percent of the Gross Domestic Product. As shown in Exhibit 24, there are 34 slipways and 22 floating drydocks.

Exhibit 24
Malaysian Shipbuilding & Ship Repair Industry

Number of Singapore Slipways & Drydocks
(as of June 1983)

Slipways		Floating Drydocks	
Size Range (tons)	No.	Size Range (000's DWT)	No.
Below 199	5	Below 5	1
200-399	3	5-29	6
400-500	7	30-49	4
600-799	1	50-99	1
800-999	3	100-149	1
1,000-1,199	-	150-199	3
1,200-1,399	5	200-399	4
1,400-1,599	3	400 +	2
1,600-1,700	-		
1,800-1,999	1		
2,000 +	6		
Total	**34**		**22**

Source: Jurong Shipyard

The consultants visited three Singapore shipyards -- Sembawang, Promet and Bethlehem Singapore -- and had in-depth discussions about the

current business situation. Topics covered the specific yard and Singapore marine industry in general.

Sembawang illustrates the problems facing MSE. The Sembawang shipyard was originally a British Naval Dockyard. It was acquired from the British government in 1968. For the first several years after acquisition 95 percent of work continued to be naval ship repair. The yard gradually phased into commercial work, and now naval repair represents about 5 percent of the total business.

The Sembawang yard is well-equipped to handle virtually any type ship repair. It has extensive machine shop capability, largely left over from the naval dockyard period. There are two graving docks, one of which can handle 400,000 DWT tankers. The yard has three floating docks one of which can lift 150,000 DWT ships. Wet berths can accommodate nine ships alongside at one time.

MSE is within sight of Sembawang. It competes with Sembawang for big tanker repair. Sembawang is better equipped and much more established. The yard appeared busy, with each drydock occupied the day of the consultant's visit.

Yet in 1983 Sembawang Shipyard just about managed to break even. The reported pre tax profits in 1983 were Sing $2.8 million, down from Sing $63.4 million in 1982.

Bethlehem-Singapore and Promet have little work. The former appears ready to close. Promet had one rig under repair, but no new con-

struction in progress. Officials at both facilities spoke about the extremely depressed conditions for their firms, and Singapore shipbuilding and repair in general. They saw little possibility for near term improvement.

It is reported that Singapore's yards managed to secure only 55 VLCC repair contracts in 1982, about half that of 1981.

Several persons knowledgeable about the Asian ship repair business commented that one or more large yards may close in Singapore. The feeling was that Mitsubishi Singapore or Hitachi Robin would be the most likely candidates to close. Mitsubishi has the shortest history and a less flexible facility that the other major yards. Hitachi Robin is the only major yard with no Singapore government financial support.

A theme running through these meetings was concern about government policies in Indonesia, Malaysia and elsewhere. There is concern that growing "build and repair local" policies will prevent Singapore yards from competing for future regional work.

Another feeling commonly expressed was a trend toward phasing down ship construction in Singapore. This is attributable to the government policy of encouraging high technology industries and reducing use of foreign labor. It also reflects a belief that customers in Indonesia, Malaysia and other countries will increasingly favor domestic shipyards for new construction requirements.

2. Indonesia

There are about 140 shipyards in Indonesia. Four of these yards are capable of building ships up to 8,000 DWT. Five yards can build ships to 3,000 DWT and about 10 yards have capacity to build ships of 500-1,000 DWT. The remainder are shipyards specializing in wooden construction, FRP boatbuilding and small vessel repair.

Information on number of facilities for new construction and repair is provided in Exhibit 25.

Exhibit 25
Malaysian Shipbuilding & Ship Repair Industry

Indonesian New Construction & Repair Facilities

New Construction

Size Range (gross tons)	No. of Building Berths
0-100	65
100-500	11
500-1000	24
1000-5000	4
Total	104

Repair

Type Facility	No. of Units
Floating drydock	15
Graving dock	14
Marine railway	107
Side track	2
Repair basin	2
Total	140

Source: Seventh Area Pacific Shipbuilding Experts Meeting, 3-7 October 1983.

The Indonesian shipbuilding and repair industry employs about 16,000 workers.

In 1980 and 1981 the government issued Degrees Nos. 10/1980, 14/1980 and 18/1981. These degrees set a policy requiring government procurement to utilize local shipbuilding sources to the maximum degree possible. A Junior Minister and an interdepartmental coordinating body has been established to assure implementation of this policy.

A former naval yard has been transformed into a government-owned limited company. The yard is now building sophisticated 25 fast patrol boats for the Customs, Marine Police and Navy.

In a recent presentation, the head of IPERINDO commented that the biggest problem confronting the Indonesian shipbuilding industry is continuity of shipbuilding orders. Without this continuity, the local yards are unable to meet owners demands for quality, reasonable price and quick delivery. This sounds very similar to the problem faced by Malaysian shipyards.

Ship repair facilities in Indonesia are reported to be quite busy. This is attributed to a government regulation requiring national fleet ships to be repaired at domestic shipyards. It is estimated by IPERINDO that the domestic yards can accommodate only 30 percent of the national fleet docking requirements. New docking facilities are being constructed or planned.

There is limited domestic supporting industry for shipbuilding in Indonesia. 60 to 70 percent of machinery and equipment is imported. To help build the supporting industry, a new regulation imposes import duty on certain machinery and equipment which are available from domestic sources.

3. Philippines

There are about 160 shipyards in the Philippines. These yards have about 90 drydocking facilities and 110 building berths. Data are shown in Exhibit 26.

Exhibit 26
Malaysian Shipbuilding & Ship Repair Industry

Philippine Ship Construction & Repair Facilities

Size Range (DWT)	No. of New Construction Berths	No. of Repair Docks
100-499	48	44
500-999	27	18
1000-1999	23	16
2000-2999	6	6
3000-3999	4	1
4000 +	3	4
Total	111	89

Source: UNIDO Expert Group Meeting on Shipbuilding and Ship Repair Development.

The consultants visited the Philippines and discussed the current situation with local shipbuilders and ship repair firms. Business is very depressed. Several yards have closed, or contemplate closing due to lack of work. The current economic difficulties in the Philippines have aggravated the shipyard's problems.

Particular difficulty is faced by Philippine Shipyard and Engineering Corp. (Philseco). This yard was recently completed. It is designed for repairing VLCC/ULCC's to 300,000 DWT. There is one large graving dock and three wet berths. The consultants visited this yard and discussed its operating experience with top management. It has become a major financial problem. There is very little business -- and prospects are not promising.

4. Korea

Massive investments have been made in the shipbuilding and ship repair industry. There are 188 shipbuilding companies. Of these, 82 shipyards produce steel vessels, 93 yards build wooden vessels, and 13 yards specialize in FRP construction. Details for facilities in the large and medium size yards are shown in Exhibit 27.

Eight years ago Korea had 1.5 percent of the world orderbook for new ships. Korea's share of the world new construction orderbook is now 15 percent.

A controversy has developed between shipyards in Korea and Japan over cutthroat competition. Each accuses the other of price cutting and "order snatching."

The shipbuilding industry in Korea has developed a significant supporting base. In fact, the marine engine manufacturing capability in Korea -- which dates only from 1979 -- now threatens the Japanese position.

Exhibit 27
Malaysian Shipbuilding & Ship Repair Industry

Major Korean Shipbuilding & Repair Facilities

Firm	No. of Drydocks	No. of Building Berths
Hyundai	4	1
Daewoo	2	--
KSEC	3	4
Samsung	2	--
Hyundai Mypo	7	--
Korea-Tacoma	1	--
Daedong	--	8
Daesun	1	5
Donghae	--	3
Shin-A	--	5
Busan Dockyard	1	--
Inchon	--	3
Busan	--	4
Total	21	33

Source: Ministry of Commerce and Industry

Hyundai Engine and Machinery Co. (HEMCO) has 140 marine engines on order. HEMCO's projected annual output of 160 engines per year exceeds that of Mitsui -- up to now the world's largest engine manufacturer.

The role of Korean shipyards was a regular subject in interviews with Malaysian shipowners and shipyards. Competition posed by Korean yards is formidable, and a major concern to yards such as Sabah and MSE.

5. Thailand

Presently there are 107 shipyards in Thailand. Only nine of these are capable of building or repairing vessels over 500 gross tons. The largest, best equipped yard is the Pomphrajul Royal Thai Naval Shipyard. It has a shiplift and two graving docks.

There has been an average of 200 small vessels built each year over the past five years in Thailand.

Among the actions taken to assist local shipyards, the Thai Government has:

- o exempted from import duties materials and components to be used in shipbuilding and repair
- o encouraged various government and state enterprises to place ship orders in domestic shipyards
- o restricted importation of ships below 1,000 gross tons by imposing custom duties

The government also takes an active role in providing land and infrastructure improvements for new shipyard investment projects.

VI. MSE DIVERSIFICATION OPTIONS

The consultants were asked to study the potential of one shipyard to diversify its activities into other than traditional marine engineering lines. MSE was chosen as the yard to study.

1. MSE Technical and Management Assets

The yard has unique, important capabilities. Having been in operation eight years, there is a cadre of skilled management and technical personnel. They know how to fabricate and handle large steel assemblies. This experience is the yard's primary asset.

Facilities of the yard are the second important asset. MSE has very modern equipment for all types of steel work. There are facilities for bending and cutting thick plate, performing nondestructive testing, preparing and coating metal surfaces, lifting heavy subassemblies, and skidding extremely heavy units for load-out and tie-down.

The third asset is MSE's established procedures for quality assurance. Such procedures are relatively easy to formulate, but not necessarily easy to install and control. With eight years experience the procedures have had time to be implemented and tested. Discussion with one major customer indicates high level of satisfaction with MSE's QA program.

MSE's fourth major asset is its location. Being a shipyard there is access to water transportation. And being in Johore the yard has convenient access to the industrial infrastructure in Singapore.

2. Diversification Has Already Occurred

MSE was set up to repair big tankers. That market did not materialize as expected and future prospects are bleak. But the yard has already diversified its business base. A new ship construction facility was built to service the patrol boat and workboat market. An engineering division was created and has penetrated the offshore and onshore engineered assemblies market. New construction and engineered assemblies now account for two thirds the yard revenue and all MSE profit. The business has already diversified.

3. Production Modules

The yard has fabricated 21 living quarters modules. Petronas has made a policy of helping MSE develop a strong capability to make such accommodation modules. However, Petronas has not been willing to channel production module work to MSE. Production modules were contracted to AG&P in the Philippines between 1977-1980. Since 1980 the work has been contracted to yards in Japan and Korea.

Engineering, fabrication, installation and hook-up of an offshore platform will consume 10 million man-hours. No single company provides such a manpower resource. It is common practice to split the project among a number of competent specialist companies.

Jacket construction is contracted to firms such as Promet. Topside modules are generally contracted to several yards, each yard getting three or four to build. A typical platform has 10-14 modules: four process, three utility, two drilling, two accommodation and one control room unit.

Exhibit 28 shows the topside units required for a self contained drilling platform built for Gulf Canada Resources. There are 12 modules plus a pipe enclosure and helideck. The accommodation modules on this platform comprise about 25 percent of the topside module weight. Modules on this platform are quite light. A platform now being bid by Brown & Root has seven main modules including accommodation quarters. Each module weighs 1,500-2,000 tons. The trend is to have fewer, but heavier modules.

Limiting MSE to accommodation modules prevents participation in the major topside fabricating activity. MSE is essentially excluded from 75 percent of the topside steel fabrication. The firm should move into production module fabrication. Management wants to do this. The problem to overcome is reluctance to use MSE for fabrication work involving stringent quality standards.

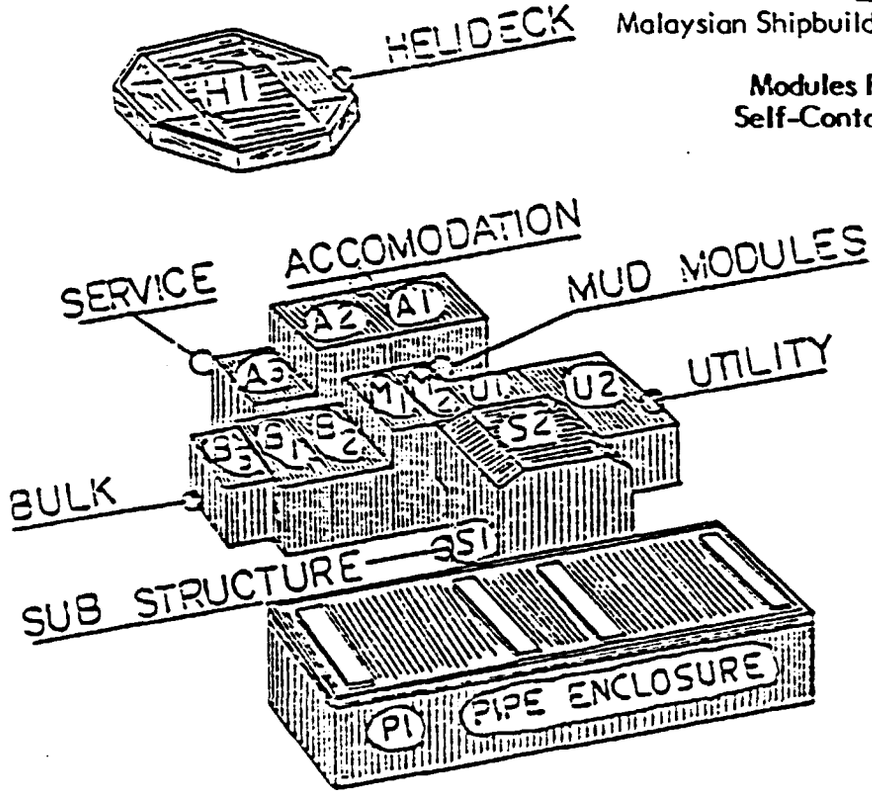
Typical topside production module fabrication involves:

% of Project Man-Hours	Type Work
30-35 %	structural
20-25 %	pipefitting
15-20 %	electrical/instrumentation
20-35 %	architectural, HVAC, helipad, control, other

To build production modules MSE may need added capability in pipefitting, millwrights and electrical/instrumentation personnel. According to MSE there should be no problem developing the necessary welding, piping and electrical skills. To the extent there are experience shortfalls, skilled personnel are available in Singapore and could be subcontracted to the

Exhibit 28
Malaysian Shipbuilding & Ship Repair Industry

Modules Fabricated For A Self-Contained Drilling Unit



MODULE		SIZE APPROX METRES	APPROX. WEIGHT - TONS			
			STRUC	MISC	OTHER	TOTAL
MUD	M1	15 x 8 x 11'2	210	13	200	423
	M2	15 x 8 x 11'2	220	8	220	448
ACCOM.	A1	13 x 16'2 x 15	300	18	265	583
	A2	13 x 16'2 x 15	300	34	265	599
SUB STRUCT.	S2	15 x 15 x 9	330	5	380	715
	S1	15 x 11 x 3'2	140	0	40	180
UTILITY	U1	15 x 8 x 7'2	140	3	140	283
	U2	15 x 8 x 7'2	140	3	170	313
SERVICE	A3	14 x 8 x 7'2	120	2	90	212
BULK STORAGE	B2	15 x 8 x 7'2	100	6	80	186
	B1	15 x 8 x 7'2	100	2	60	162
	B3	9 x 6 x 7'2	50	2	20	72
PIPE ENC.	P1	57 x 17 x 13	450	4	60	514
HELIDECK	H1	29 x 29	200	0	10	210
PROJECT TOTAL			2800	100	2000	4900

extent necessary on initial work. Instrumentation is a problem and MSE would need to employ foreign experts who have the necessary processing design expertise.

Offshore customers place great emphasis on ability of the contractor to meet schedules. In order to assure customers that deadlines will be met, MSE should develop, and be able to demonstrate back-up capability to expedite work if necessary. This back-up capability extends into the engineering and subcontractor supply network. The yard must also take whatever steps needed to acquire additional technology skills needed for production module assembly. This may entail a joint venture with an established firm such as Brown and Root, McDermott, or Redpath-Dorman Long.

Production module fabrication can provide a large business base. Petronas projects orders for a minimum of two platforms annually. This will produce requirements for 20 $\pm$ modules each year.

MSE needs the full support of government to maximize its penetration in the production module market. Leverage can be applied by Petronas on the oil companies to use MSE for module fabrication. Assuming MSE takes all necessary steps to meet deadline and quality control requirements, it is in the country's interest to promote MSE's involvement in the production module market.

It is worth noting that the modules shown in Exhibit 28 were built for a drilling unit to be operated within Canadian territory in the Beaufort Sea. These modules were built by Dominion Bridge Sulzer, a Canadian firm

in Montreal. This firm had no special experience in offshore module fabrication. After completion the modules were shipped to Japan to be married to the caisson. It doesn't require much imagination to visualize the subtle, and not so subtle pressures placed on Gulf to build the modules in Canada.

4. Rolling Stock Fabrication

The Malayan Railway Administration plans to purchase numerous passenger coaches and freight cars as part of the rail revitalization program. MSE has already participated in this procurement by fabricating 306 flat wagons and 10 passenger coaches. New rolling stock orders are expected shortly.

Fabrication of rolling stock is an activity many shipyards perform, particularly when their basic ship market is depressed. Such work fills a business vacuum. But this type work is better suited to a production shop environment. A shipyard is best utilized as a fabrication area for large, heavy assemblies. Rolling stock is best performed in a manufacturing shop laid out for straight line flow utilizing assembly line techniques.

In MSE's situation, rolling stock fabrication can be a good near to mid-term source of business. MSE has a separate 17 hectare area laid out specifically for fabrication of rolling stock. A new 5,000 sqare meter workshop and two 25 ton cranes are on the site. There is substantial expansion possibility around the rolling stock complex.

In the initial passenger coach order, MSE subcontracted assembly of 40 of 50 coaches to Korea Shipyard Engineering Corp. Until now MSE has

been assembling rolling stock in engineering shops intended for heavy assembly fabrication. The new rolling stock complex is almost finished. MSE is able to complete large rolling stock orders in the expanded facility, and except for components not available locally, minimum subcontracting should be employed.

5. Onshore Fabrication

MSE has already fabricated assemblies for industrial and civil projects. Future government and private projects such as palm oil plants, bridge construction, port facilities, steel plants, auto plant . . . have requirements for large, heavy fabricated steel assemblies. There will be many opportunities to use MSE engineering and fabrication capabilities.

6. Summary

Offshore module fabrication is the principal line of business MSE can develop over the next 5-10 years. This sector can produce significant revenues. It is a business which has export potential as MSE moves down its production learning curve. Government assistance to help penetrate the sector (via leverage over Esso and Shell) will have great pay off.

Other important areas for business diversification are rolling stock manufacture and onshore assembly fabrication.

MSE has already taken steps to move in these directions.

VII. SHIPBUILDING/SHIP REPAIR DEVELOPMENT PLAN

The industry should be rationalized, actions taken to improve coordination, and demand enhanced through government policy and directives.

I. Industry Rationalization Is Needed

The shipbuilding and repair industry in Malaysia has grown without direction. Individual decisions appear to have been made with little consideration of parallel activities taking place elsewhere in Malaysia. MSE, for example, invested in a construction and repair yard oriented toward patrol boats — long after the Lumut naval facility was planned. Promet and Sembawang were licensed to start new offshore fabrication yards -- at a time when MSE was struggling to build its engineering division.

This is not to say such developments are bad. There are many advantages derived from competition. The problem is there are too many yards in Malaysia chasing too little business. As the market is spread more thinly over the growing shipyard base, each yard becomes more reluctant to invest in capital improvements. This causes domestic prices to remain high, quality does not improve and schedule reliability suffers. This in turn discourages customers from placing orders in domestic yards, further aggravating the problem.

It appears a controlled shrinkage in the industrial base is required. Individual shipyards must foresee adequate business throughput if they are to make labor saving and quality improvement investments. The simple fact is there are too many yards in Malaysia for the amount of available business.

A start in the right direction would be to encourage merger or closure of several facilities:

- o PSC and Hong Leong-Lurssen would seem to be likely candidates for merger. Hong Leong-Lurssen has good workshop facilities and skilled staff. However, the yard is made redundant by the Lumut facility. PSC lacks workshop facilities, but has diversified commercial construction experience. The merged activity could combine the strongest assets of each yard
- o Ironwoods and Brooke are also candidates for merger
- o LTSB has marginal facilities and really has extremely limited capability to build and repair. It draws business from other yards, and then subcontracts foreign because it hasn't the capability to perform the work. The yard could revert to a training facility, which was its original objective

A second step would be to establish coordination between MSE, Sabah, Promet and Sembawang in the offshore fabrication sector. These facilities could provide in-depth back-up to each other. This is an important consideration to offshore customers worried about meeting schedules. MSE and Sabah could handle module fabrication; Promet and Sembawang could specialize in jackets. Bids could be submitted by the group, rather than individually. There is a trade-off, of course. Competition is eliminated. But considering the importance placed on schedule reliability, and the size of the available market, the benefits of coordination would seem worth the trade-off.

The third step would be to encourage a degree of specialization in specific market sectors. This would allow each yard to more rationally structure its facilities to accommodate certain types of expected demand.

Another obvious [illegible] is to provide increased demand for the existing shipyard industrial [illegible] the subject of a later section in this chapter.

Political and socio-economic considerations will obviously temper these recommendations. But, from an industry development viewpoint some rationalization should take place if the industry is to grow and mature.

2. A Point of Government Coordination Is Required

There is no government agency coordinating the development of the shipbuilding/ship repair sector. Many agencies at the federal and state level are involved.

MSE is under the Ministry of Public Enterprises. Sabah, Brooke and PSC are state-owned enterprises. LTSB is owned by Mara and its channel to government is the Ministry of National and Rural Development. Hong Leong-Lurssen, Ironwoods and the small Sarawak yards are private companies.

MSE, Sabah, Brooke, PSC and LTSB have their own sponsor. Each uses political power to try to obtain awards. Hong Leong-Lurssen, Ironwoods and the small yards get the scraps.

Bank Kemajuan is in the difficult position of being pressured by power groups, without guidance as to direction. No plan has been established by government for development of the shipyard sector. No agency is responsible for coordinating its growth. Various parties attempt to promote special interests and the Bank handles requests on a case to case basis.

Two models of how to coordinate the shipyard sector are provided by Korea and the Philippines:

- o in Korea the government agency primarily responsible for shipbuilding policy and its administration is the Shipbuilding Division of the Ministry of Commerce and Industry. This Ministry works closely with the Korea Maritime and Port Administration (KMPA), which is in charge of shipping policy. It also coordinates with the National Fisheries Administration, which is in charge of the fisheries industries.

- o the Philippines has placed all aspects of shipbuilding and shipping policy under one agency, the Maritime Industry Authority (MARINA). This agency was established as a prerequisite to receiving a US $20 million inter-island shipping loan from the World Bank. It has divisions for domestic shipping, overseas shipping, shipbuilding and ship repair, and maritime manpower. Shipyards must be registered with MARINA to be eligible for special incentives available to the shipbuilding industry. This registration procedure is used to control the number of shipyards. Of the 167 shipyards, only 67 are registered.

A structure similar to the Philippines is recommended for Malaysia. Both shipping and shipbuilding/ship repair should be placed under the control of one agency. The Korean structure is geared toward planning and controlling development of a shipbuilding industry actively competing in the international market. The Philippines is more designed for a shipbuilding industry supporting the country's domestic building and repair requirements -- a situation closer to that of Malaysia.

The Fourth Malaysia Plan provides for creation of a Ministry of Maritime Affairs. This Ministry should be given the current functions of the Maritime Department in the Ministry of Transportation and be given

planning and administration responsibility for government policies in the maritime sector. Among its functions would be development of a long term plan for the shipping (domestic and international) and shipbuilding/ship repair industries.

3. Priority of Shipbuilding/Ship Repair Sector Should Be Established

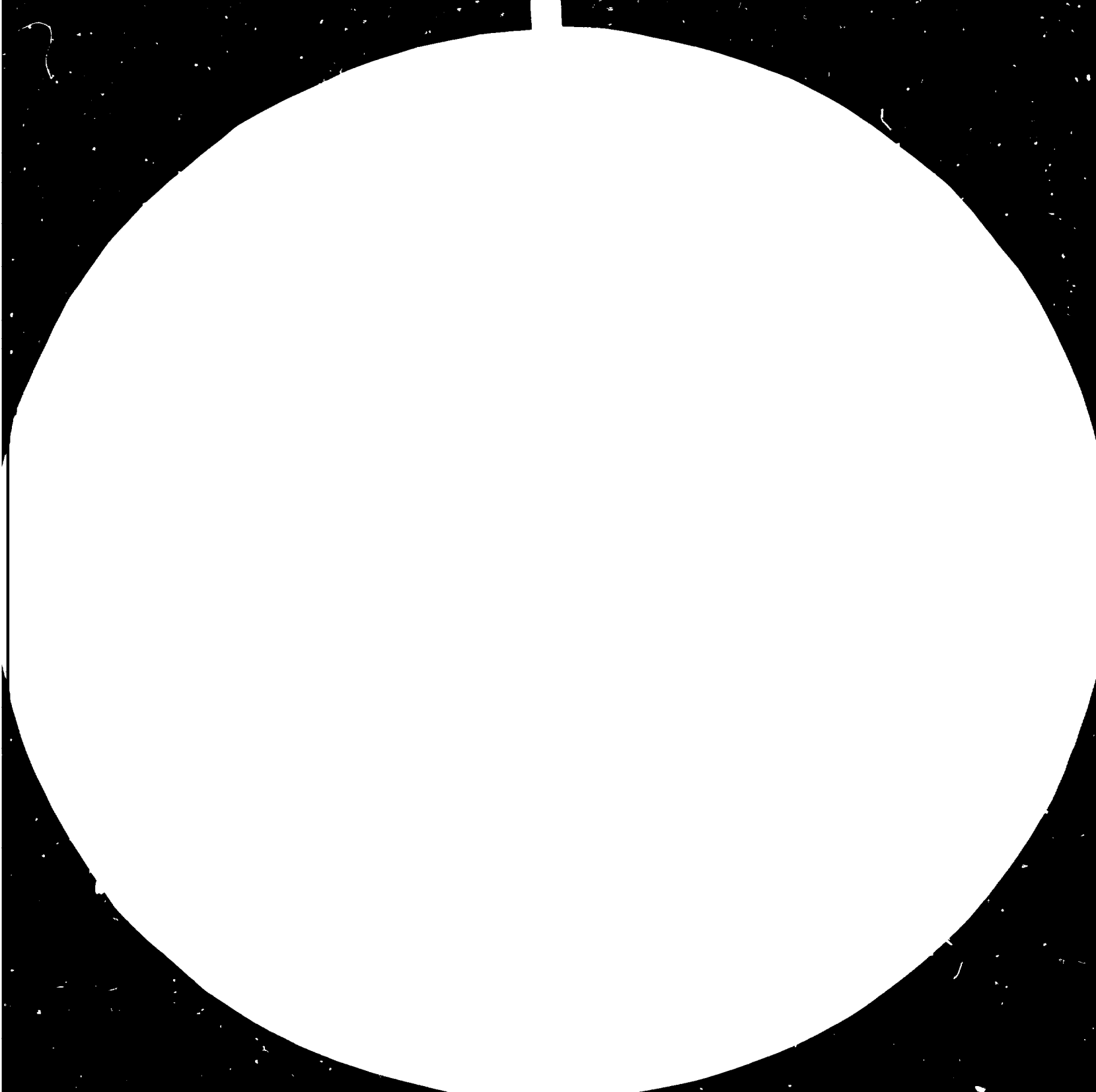
The Government is planning many important projects as part of the industrialization drive. Shipbuilding and ship repair has already been shown to be an industry of value to the economy. But where does it fall relative to other industrialization projects? The industry is not even mentioned in the Mid Term Review. Yet, as has been pointed out, it is one of the few heavy engineering industries already in existence in Malaysia.

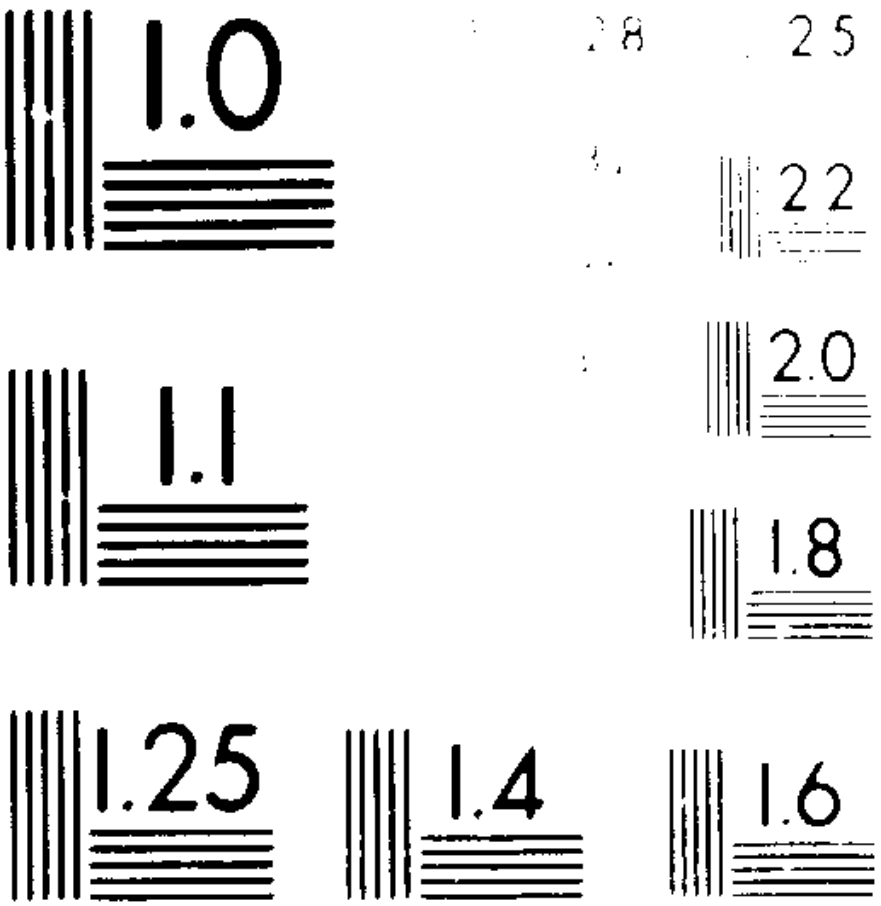
The sector's priority should be established because its development will require public expenditures. Some of these expenditures will be direct outlays for improving facilities. Others will be indirect, such as the added transport cost caused by a directive to repair ships in Malaysian yards.

This priority can only be established by the government agency responsible for industrialization planning.

4. Sector Development Will Be Promoted By Increasing Demand

A variety of actions can be taken to provide work to the shipbuilding/ship repair industry. Lack of adequate work to support the present industrial base is the basic problem. A combination of rationalization (already discussed) and improved market demand will provide the framework for industry development.

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In the remainder of this section it is assumed that the priority accorded this sector within the overall industrial planning and budgeting process justifies the commitment each recommendation entails.

(a) Formulate and Implement Regulations To Restrict Use Of Inefficient and Unsafe Vessels In Malaysian Coastal Trade -- The coastal fleet is old. Many vessels are more than 20 years of age. They have high fuel consumption, employ obsolete handling concepts, and probably have low reliability. Many are unsafe. A program for replacing or modernizing such vessels will result in more efficient coastal transport and lower shipping costs.

It is recommended that a specific age not be specified for determining whether a ship is obsolete. A well-maintained 25 year old ship may be superior to a ten year old ship. Instead, the new Ministry of Maritime Affairs should develop a list of technical criteria against which to rate relevant ship operating features. Trained marine surveyors should then be used to evaluate each ship in the coastal fleet. Vessels not meeting threshold ratings would be given a limited time period to make necessary improvements. Beyond that period the registration would be revoked and the ship no longer permited to trade between Malaysian ports.

(b) Enact Legislation Requiring Domestic Trading Ships To Be Built In Malaysia -- At present coastal trading ships must be Malaysian owned and registered, but can be foreign built. Legislation requiring domestic construction, particularly when combined with the preceding recommendation, would produce demand for local

shipyards. This requirement already has been introduced in Indonesia, where ships below 3,500 DWT must be built in domestic yards. The Indonesian government plans to increase this threshold to 8,000 DWT as the local shipbuilding industry capabilitity grows.

An alternative to outright restriction is a tax on foreign built ships intended for use in the domestic trade. Such a recommendation has already been advanced by the Association of Shipbuilders and Repairers of Malaysia.

(c) Restrict Importation of Secondhand Ships -- There will continue to be a supply of used vessels available to local owners. It is standard practice for Japanese owners to place ships for sale prior to the second special survey. It is hard for a local shipyard to compete with a ten year old secondhand vessel. To encourage construction of new vessels there could be a flat restriction on importation, or a significant import duty which would better balance the competitive situation.

(d) Provide Incentive For Malaysian Owned Ships To Be Repaired Domestically -- This incentive could be provided through various mechanisms. An import tax could be levied on repairs performed by Malaysian shipowners in foreign yards. The U.S., for example, imposes a 50 percent duty on overseas repairs to U.S. registered ships.

A more drastic approach is to tie domestic repair to authorization to load cargo in Malaysian ports. Sabah has already issued

such a directive. All ships beneficially owned by Malaysians must repair in local yards. The owner must present a certificate from the shipyard before being permitted to load cargo. This concept can be adopted elsewhere and can be extended to include the ship's construction.

(e) Employ Leverage on Firms Using Malaysian Natural Resources -- Access to rubber, palm oil, timber and oil resources could be linked to requirements designed to generate business for Malaysian shipyards. This leverage is already being applied. Jackson Marine plans to place orders in Malaysia for five offshore workboats which cost 15 percent more than they would in Singapore. Esso and Shell placed module orders with MSE, who at the time had no experience fabricating accommodation modules. This could be expanded to include repair of big tankers, fabrication of production modules, purchase of domestic built ships . . .

(f) Provide Financing For Selected, High Quality Ship Export Sales -- To compete with foreign yards, companies such as Sabah Shipyard must have access to government backed financing on export orders. The basic framework for such financing is already in place at Bank Kemajuan, but exposure constraints limit the program's use. If export sales are to be promoted, a budget ceiling of $100-200 million annually in financing guarantees is needed.

However, this is a very risky activity. Financing applications for export sales should be able to withstand a very thorough financial risk analysis.

(g) **Assist In Improving Shipyard Technology** -- The government can provide certain high cost technology improvements which may be beyond the financial reach of any one shipyard. Such assistance is provided in other countries. In Indonesia, for example, the Marine Department of the Agency for Research and Application of Technology sponsors shipbuilding technology research and development. A similar function is performed in Japan by the Ship Bureau and Ship Research Institute in the Ministry of Transport. In Korea, the Korea Institute of Machinery and Metals carries out shipbuilding technology research and development.

(h) **Eliminate Duties and Import Restrictions** -- Malaysian yards must compete with yards in Singapore and other open trading industrial centers. Customs regulations, duties, import restrictions make it more difficult to compete. These rules should be minimized to the extent possible.

5. Several Management Actions Would Improve Yard Performance

While the basic problem of Malaysian shipyards is inadequate workbase, changes in operational procedures, improved training and other management actions can increase yard efficiency. Several of these changes are briefly described below.

(a) **Roving Yard Engineer** -- One major customer of MSE observed there is limited flexibility at the yard worker level to react to issues and/or changed circumstances as they unfold during a re-

pair job. Workers tend to follow work orders and not have the breadth of experience and/or seniority to take obvious shortcuts. In this customer's opinion "there is too much technical compartmentation, lack of imagination, and yard personnel follow work orders when more experienced employees would identify and take shortcuts while work is being performed." This customer went on to say this is characteristic of many yards in the region.

A way to correct this deficiency is to use several "shipyard-smart" engineers as roving yard advisors. They would have authority to change work orders -- on the spot -- when a different approach appears more appropriate as the job progresses.

(b) Training -- Lack of relevant training facilities is an issue raised by many shipyard officials. It would be highly useful if a vocational training institute(s) existed to teach basic shipyard crafts such as shipfitting, welding and pipefitting. The Ministry of Education has plans to study whether to establish such a special vocational training facility. This should be further pursued.

(c) Yard Coordination -- Further penetration into the offshore sector, particularly production module fabrication can be greatly improved by cooperation among the interested shipyards. As already discussed, the offshore customer greatly values delivery reliability. Operating as a group, rather than individually, the yards provide the customer more assurance the project will be completed on schedule. The full resources of the group stand behind meeting the agreed schedule.

(d) Quality Assurance -- Continued efforts should be made to improve the quality assurance program at each of the major shipyards. This is an area where foreign technical assistance could prove quite useful. Technical advisors from countries with advanced quality assurance programs could be engaged for a short period to design and implement a QA program for the shipyard and its subsuppliers.

(e) Foreign Technical Cooperation -- To move into more advanced ship designs, and the offshore sector, Malaysian shipyards should establish technical cooperation agreements with experienced foreign shipyards and engineering firms. Many such cooperative agreements have already been established. Future agreements should emphasize the retention of rights to designs and processes.

6. Ancillary Industry Development Requires Sensitivity To The Shipyard's Position

As has been pointed out, very little supporting industry for the shipbuilding/repair sector exists in Malaysia. There is an strong desire to develop such supporting industry in order to obtain spin-off effects.

This supporting industry development must be carefully managed. Requirements to use domestic sources will cause shipyards to be less competitive. In the United States, for example, machinery and components in ships built with government aid must be from domestic manufacturers. This requirement has been in effect for over 50 years. It is one of the principal contributors to the U.S. being completely noncompetitive in the world shipbuilding market.

Most countries attempting to develop their shipbuilding industry make it easier to import necessary equipment. Indonesia, for example, has exempted from duty all imports of ships' material, machinery, components and spare parts, except for certain components available locally.

It is recommended that requirements to use locally produced components be very carefully introduced. There should be great sensitivity to the impact on shipbuilding costs, quality, and delivery schedule.

7. Resource Commitment

As already noted, any attempt to promote shipbuilding/ship repair industry entails substantial cost and government financial commitment:

- o higher initial ship prices
- o higher repair costs
- o longer delivery times
- o government financial outlays
- o higher shipping costs
- o reduced profits from resource production

Yayasan Sabah, for example, paid an additional 40 percent to build log carriers at Sabah Shipyard. Costs such as these must be passed along to transport users. If the transport user cannot, or will not pay higher freight costs the shipowner will have to accept lower profit. Either way the costs of protecting domestic shipyards will eventually be reflected.

The benefit is providing domestic shipyards an opportunity to compete for work which otherwise would be placed in foreign yards. Significance of these benefits to the Malaysian economy has been described ear-

lier in this report. Costs should fall as yards gain experience and throughput increases. With sufficient volume of work there is no inherent reason why Malaysian shipyards cannot be cost competitive. And in the process there are employment benefits and linkages to other parts of the country's industrialization program.