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Malaysian sector profiles conducted
for the Canadian High Commission,
Kuala Lumpur : sector :
transportation
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TRANSPORTATION

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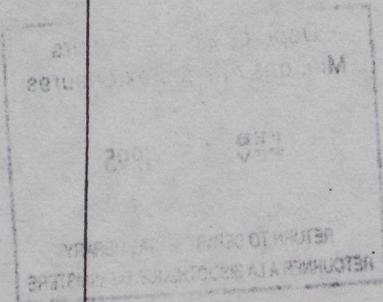
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TRANSPORTATION SECTOR PROFILE

RESEARCH
CONDUCTED FOR
THE CANADIAN HIGH COMMISSION



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DECEMBER 1989 with amendments
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EXECUTIVE SUMMARY

The Transportation Sector in Malaysia is currently going through a period of rapid growth and reorganization. These changes form part of the Government's commitment to develop infrastructure so that the country can continue its course of rapid manufacturing and other economic expansion. Real Gross Domestic Product is currently growing at around 8 per cent per annum and growth rates of this magnitude are expected to continue into the 1990's.

Transportation developments which are planned or under discussion include the following :

<u>Project</u>	<u>Page Reference</u>
AIR:	
Corporatization of Major Airports	1
Purchase of Aircraft by Department of Civil Aviation	4
Inspection of Airline Operators and Flight Operations	3
Inspection of Airports	4
Insurance of Corporatized Airports	4
Installation of Surveillance Radars	4
Replacement of the Automatic Message Switching System at Subang with an Aeronautical Fixed Telecommunication Network.	4
New Air Traffic Control Centre at Subang	4
Upgrading of Non-Directional Beacons into VHF Omni-range	5
Additional Secondary Surveillance Radars	5
Satellite Based Communication Systems	5
Subang Airport (KL) Development	5
Kuantan Airport Development	5
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Upgrading of MAS Maintenance Capabilities (including construction of a new engine workshop)	10
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As far as Canadian involvement in the transportation sector is concerned, our discussions with senior contacts in the relevant transportation sub sectors revealed the following general findings :

- i) there is only a limited knowledge among Malaysian decision makers about the products, services and capabilities of the Canadian transportation industry.
- ii) if this limited knowledge is to be overcome, there is a need for Canadian interests to establish a local presence by appointing competent Malaysian agents. These agents would perform a marketing role and would keep potential end users up to date on new Canadian products and services.
- iii) our contacts placed a high value on product and after sales service and support. If Canadian companies are to enter the Malaysian market this area needs to be addressed carefully. The ability to support Canadian products technically could be one of the criteria to be used when making decisions regarding the appointment of agents.

Currency conversions from Malaysian to Canadian dollars are based on C\$1 = M\$2.30. This is within the range of rates prevailing on March 22nd, 1990.

1.0 DEPARTMENT OF CIVIL AVIATION

The Department of Civil Aviation (DCA) currently acts as both a regulatory body and also as the manager of the nation's airports. However, legislation is planned that which will allow for the corporatization of the 12 major airports in the country. The nominated Chairmain of the government owned corporation which will manage the airports is Tan Sri Bashi Ismail who was formerly Chairman of Bank Bumiputera, the nation's second largest commercial bank. There are two principal contenders to serve as operators of the airports. These are the British Airport Authority and a joint venture between Lockheed and local telecommunications company, Sapura Holdings.

The new corporation, probably to be called the Airport Management Corporation (AMC), is due to take over responsibility for the major airports on 12th January, 1991.

DCA will remain as mainly a regulatory body to be known as Kawal Selia. In this role it will attend to security matters and common user needs at the airports and will retain the old DCA divisions of Airport Development, Engineering, Flight Operations, Air Traffic Services, Aeronautical Communications, Fire Safety and Rescue, and Security. Kawal Selia will still have responsibility for the management of smaller rural airports.

With the corporatization of DCA, the feasibility of airport expansion projects should be scrutinized more closely since most projects will be funded from the corporation's own sources. However there may be exceptions to this in cases where the Government contributes funding in the name of community benefit or where it wishes to provide better air services as an inducement to industry to locate in certain areas.

1.1 Flight Operations Division

The Flight Operations Division is made up of three separate units, namely Air Worthiness Unit, Calibration Unit and Licensing Unit. The functions of the Air Worthiness Unit are as follows:

- i) to conduct examinations and to issue the necessary licences for aircraft engineers
- ii) to approve specification on engineering schedule for aircraft
- iii) to inspect aircraft and operator's engineering set up; and
- iv) to conduct aircraft accident investigations

The Air Worthiness Unit is also responsible for compiling the Aircraft Register summary.

The Calibration Unit currently has 4 aircraft - two King Air 200's, one Cessna 206 and one Britten Norman Islander. These are maintained and overhauled by Hawker Pacific in Singapore at an annual cost of about C\$235,000.

In terms of development expenditure for the next five years, the biggest expenditure would be the purchase of aircraft worth C\$13 million. The Department has yet to explore the various possibilities in terms of choice of aircraft. The cost of the equipment (i.e flight inspection system, navigational aids) to be installed inside the aircraft is estimated at about C\$870,000.

With regard to consultancy services, the following are projects for which the Department may require assistance over the next few years :

- i) **Inspection of Airline Operators and Flight Operations**
DCA lacks the experience and expertise to set up a watchdog or enforcement body responsible for inspection of airline operations.
- ii) **Inspection of Airports**
At the moment DCA lacks the expertise to set up a body to conduct regular inspections of airports. Thus consultants will probably be required to provide the necessary training.
- iii) **Insurance of Airports which will be managed by the Corporation**
While the question as to which airports will come under the management of the corporation has yet to be determined, a key issue which remains to be addressed is the insurance of the privately managed airports.

1.2 Air Traffic Services Division

Under the on-going Air Traffic Services Modernization Project which the Air Traffic Services Division of DCA is currently conducting with the Australian firm Avtel as the consultants, three projects have been identified and approved for implementation. The projects are :

- installation of three secondary surveillance radars and one primary surveillance radar. Tenders have been called and it is intended that the project will be implemented before the end of 1990.
- replacement of the automatic message switching computer system at Subang airport with a new system for Aeronautical Fixed Telecommunication Network (AFTN) which is a telex system dedicated to aviation. This project is awaiting Government approval.
- construction of a new air traffic control centre to be located opposite Terminal Two at Subang. It is planned to call tenders for this project around May/June 1990.

Together with the installation of new radars, DCA plans to embark on a more sophisticated radar data processing system (RDPS) and flight plan data processing system (FPDPS). These are new areas of growth which will most likely be covered under the Sixth Malaysia Plan (1991-1995).

With regard to navigational aids, there are plans to upgrade some of the existing non-directional beacons into VORs (VHF Omni-range). It is not known yet how many of the non-directional beacons will be converted since this is subject to budget approval. It is not yet known if the budget approval for the upgrading of the non-directional beacons into VORs will be decided by the new Corporation or by the Government.

The various projects which have been identified by the DCA for implementation under the Sixth Malaysia Plan include :

- i) Installation of three additional secondary surveillance radars; two in Peninsular Malaysia and one in East Malaysia (Bintulu).
- ii) Improvements to the Communications System : This would involve a move towards satellite based aviation navigational systems.

1.3 Airport Development Division

1.3.1 Airport Development Projects in Peninsular Malaysia

Airport infrastructure in Peninsular Malaysia is "relatively advanced/matured" with most major airports being capable of handling at least Boeing 737 jets.

a) Subang Airport

Subang Airport near Kuala Lumpur was first opened as an international airport in September 1965. Its two terminals are now handling about 5-6 million passengers per year and the airports is expected to reach maximum capacity by the mid 1990's. Thus there will be a need for additional facilities including a runway, terminal building, parking facilities and all other associated facilities.

b) Other Airport Development Projects

Kuantan Airport

The Government has approved the upgrading of Kuantan Airport to cater for B757 operations. The upgrading of this airport, which is in line with efforts to promote Kuantan as a major tourist destination, involves extension of the runway by 1000 feet. In addition, there are plans to build a new terminal, parking apron and other associated airport facilities. The project is currently on hold and Taylor Woodrow are undertaking a feasibility study to see whether it should go ahead.

Malacca Airport

There are plans to extend the Batu Berendam airport in Malacca by 400 meters at a cost of about M\$5 million (C\$2.2m) to accommodate larger aircraft. Presently only two airlines use the airport, namely Pelangi Air which runs its Ipoh-Malacca-Singapore route

three times a week and the Pan-Malaysian Air Service which operates a weekly flight from Malacca to Pekan Baru, Sumatra. The runway can only accommodate small aircraft such as the Fokker 27 and Dornier 228 at the moment. The airport is used extensively by the Malaysian Flying Academy and the armed forces for paratroop training.

If the extension plans comes to fruition, the State Government of Malacca plans to bring in chartered flights from Hong Kong, Taiwan and Singapore. However, to date there have been no steps taken to conduct feasibility studies or to take other action towards implementation.

With regard to the other airports in Peninsular Malaysia, there are no plans for major renovations other than small improvements and replacement of equipment such as navigation systems, fire-fighting vehicles and security equipment.

1.3.2 Airport Development Projects in East Malaysia

. Sarawak

The Government of Sarawak has approved the construction of a new airport for Sibu capable of handling B737 flights. The cost of the project is estimated at approximately C\$43.5 million. The consultants for the project are a local firm, Minko, who have completed the detailed designs. The Government is at the stage of inviting tenderers for the project which is expected to commence later in 1990 and is due for completion in 1992.

There are plans to construct a new airport in Bintulu. However these plans have yet to be approved by the Federal authorities. Bintulu currently has an airport which is capable of handling only F27 operations during daylight hours. Since the present airport is located in the middle of the town, there is very little scope for improvement and the only viable solution would be to build a new airport in a new location.

. Sabah

The airport in Tawau is currently capable of handling Boeing 737 flights but the runway is not long enough to enable B737 aircraft to operate at its maximum takeoff weight. Plans have been drawn up in the past to build a new airport at a new location since the present airport is located very close to town (and therefore there is very little scope for expansion). These plans have yet to be approved.

As is the case with Bintulu airport, the Lahad Datu airport in Sabah is capable of handling only F27 operations during daylight hours. There is little scope for improvement to the present airport due to the close proximity of the airport to the town. However, the traffic handled at the Lahad Datu airport has been quite static for the past few years. This could be attributed to the diversion of traffic from air to road transport following the completion of new roads linking Lahad Datu with Sandakan and

Tawau. For the time being, the Department of Civil Aviation is limiting development plans for the Lahad Datu airport to terminal building improvements.

In November, 1989, the Prime Minister announced plans to develop the Federal Territory of Labuan (an island off Sabah) into a tax haven. If the Government goes ahead, the basic infrastructure of the present airport will have to be improved. Currently, Labuan airport does not have the capability of handling B747 operations. Furthermore, the terminal building is quite small.

1.3.3 Consultancy Services

Most of the airport development projects were implemented with the assistance of consultants. Some of the consultants who have been involved in airport development projects include:

- Sir Frederick Snow and Associates (U.K)
- Acres International Ltd (Canada)
Acres provided consultancy services for air transport requirements, development of a national aviation plan and master planning of four major airports in Malaysia, including the Subang International Airport.
- Minconsult Sdn Bhd (local)
- Ranhill Bersekutu Consultants (a joint venture with Ranhill of Australia)
- Jurutera Consultants (local)
- Avtel (Australian)
Avtel and Jurutera Consultants are currently preparing the Subang Airport Phase II Master Plan.

Although some airport development projects can be carried out by local consultancy firms, foreign consultancy expertise is, however, still required. Foreign groups are advised to team up with local engineering firms in order to enhance their chances of success in tendering.

The three most important areas of airport development for Canadian companies to focus on are as follows :

- Airport infrastructure planning
- Airport development planning
- Environmental Impact Assessment (EIA) studies

Malaysia does not currently have local expertise to conduct complex EIA studies relating to the aviation industry.

1.4 Procurement and Local Agents

Nearly all procurement by DCA is done on a tender system. The Department will spell out the specifications required and invite tenderers through advertisement in the papers. The tender is opened by a Tender Committee which consists of a representative from the Ministry of Transport and two representatives from DCA. The tender is then evaluated by a Technical Committee and a Financial Committee following which DCA will make a presentation before the Ministry of Transport Tender Board Committee. This Tender Board Committee normally selects the lowest bid that complies with the specifications as spelled out by DCA.

The critical factors that are taken into consideration in the evaluation of a tender are :

- i) technical superiority of product
- ii) cost and
- iii) countertrade

The standard procurement procedure is to operate through an agent or representative of the manufacturer. None of the suppliers sell directly unless the purchase is a government to government purchase.

According to government policy, agents appointed by the manufacturers must have local equity and participation.

DCA, being a Government organization, is exempted from import duties and sales tax.

1.5 Knowledge of Canadian Aviation Products and Services

The general feeling within DCA was that Canadian manufacturers are poorly represented in the local aviation industry and consequently the capabilities of the Canadian aerospace industry are not well known. This is also a feeling that Canadian aviation products are not priced competitively and that product support and after sales services are lacking.

To overcome these perceptions it is important that the manufacturers or their appointed agents should establish a good working relationship with the consultants hired by the DCA to advise on aviation projects since the consultant is responsible for recommending the use of a particular type and brand of product.

Staff at DCA rarely refer to the OEM directory to obtain information regarding the sourcing of products.

1.6 Canadian Suppliers to DCA

The following Canadian companies have supplied equipment to the Department of Civil Aviation.

- . Audor Communication Inc - air traffic consoles for Ipoh Airport
- . Raytheon Canada Ltd - surveillance radar for Subang International Airport
- . CAE Electronics Ltd - flight simulators

Canadian companies serious about entering the market in Malaysia, should appoint a local agent to represent their product/service in Malaysia.

1.7 Foreign Suppliers

Although there has been no definitive market leader in the supply of aviation products, the French company Thomson-CSF has been the dominant supplier of telecommunication equipment in the past few years. Thomson-CSF, the defence electronics branch, has been represented in Malaysia since 1981 with a maintenance workshop and a liaison office of its telecommunications division. It has supplied Malaysian civil aviation with navigational aid systems including :

- . Instrument Landing System (ILS) in Subang, Kuching and Johor Baru
- . Distance Measuring Equipment (DME) in Mersing and Kerteh
- . VHF Omnidirectional Range Beacon/Distance Measuring Equipment (VOR/DME) in Kota Kinabalu and Kuching
- . Airbus 300 simulator.

Among other suppliers, Plessey (U.K) and Phillips (Netherland) have supplied navigation landing aids and Litton (USA) were the source of an automatic flight inspection system.

2.0 MALAYSIA AIRLINES

Malaysia Airlines, formerly Malaysian Airline System (MAS), is the national airline company. It was established in 1971 as a 100% government owned operation. In 1985, the Malaysian Government decided to privatize it and today retains only 42% equity shareholding. The breakdown of major shareholders as of 20th October 1989 is as follows :

Bank Negara Malaysia	42%
Brunei Investment Agency	10%
Pemegang Amanah Raya Malaysia/Sekim Amanah Saham National	8%
State of Sarawak	5%
State of Sabah	5%
Other Shareholders	30%

Figure 1 summarizes Malaysia Airlines inventory of existing aircraft as at July 21st 1989 as well as the fleet of 39 new aircraft to be purchased under its five year C\$2.4 billion fleet modernization and expansion programme. This programme, which saw orders for 39 new aircraft between November 1987 and July 1989, is the biggest since the national carrier first took to the skies in 1972. As part of the programme, Malaysia Airlines is to start phasing out its 36 aging aircraft in March 1990.

Figure 1:



Two of the B747-400's had been delivered by March 1990 and 9 of the new Fokkers 50's are due in April.

The 10 B737-400's and 6 B737-500's under the programme are due to be delivered from May 1992 through April 1994. A further 16 are on option. In addition, the airline has signed an agreement with California based International Lease Finance Corp for the lease of seven B737-400's with delivery between January 1990 and July 1991. The lease is due to expire in 1993.

The B737-500 series, which is expected to receive the Federal Aviation Administration certificate in March 1990, will be fitted with the CMF 56-3-B1 engines produced by CFM International, a company jointly owned by General Electric of the US and SNECMA of France.

To conclude its fleet expansion programmes, Malaysia Airlines signed an agreement with Airbus Industrie in July this year to purchase eight A330-300s. At approximately C\$1 billion, the agreement, which included a further option to purchase another eight aircraft is the single largest aircraft purchase order the national airline has ever made. Under the agreement, Airbus agreed to receive payment of up to US\$150 million in the form of local goods and produce up until 1997. The agreed items in the countertrade deal include tin, timber, cocoa, canned food, shrimps and furniture. The A 330-300s will be deployed on Malaysia Airlines short and medium haul routes and will replace the airline's four A300s and three DC 10 aircraft. Four of the A 330-300s are expected to be delivered in 1994 and the other four in 1995.

In October 1989, Malaysia Airlines signed a purchase agreement with United Technologies International Inc to buy 16 Pratt and Whitney installed engines on the eight A330-300 aircraft. The agreement included an option for engines on another eight aircraft and a total capital investment including spares of about C\$276 million. The 29,000 kg thrust PW4164 engines which will be used to power the new A330-300 aircraft represents the newest and most powerful version of the PW4000 series.

With regards to the financing, the Managing Director of Malaysia Airlines, Tan Sri Abdul Aziz Abdul Rahman, has announced that the bulk of the financing arrangements for the airline's newly purchased aircraft will be finalized either by the end of the year or the middle of 1991. So far, the airline has finalized the financing for the two B747-400s and the nine Fokker 50s, totalling C\$391 million. About C\$130 million will come from the airline's internal sources while the rest will come from borrowing. According to its annual report for the 1988/1989 year, Malaysia Airlines has cash and bank balances totalling C\$1/2 billion as at March 31st, 1989. The financing will also involve leveraged leases.

The financing arrangement for the remaining 28 new generation jets, including the long-range B747-400s and A330-300s, is expected to include borrowings from both local and foreign sources.

2.1 Procurement Practice

With regard to procurement, Malaysia Airlines sometimes deals directly with manufacturers in the event that there are no local agents representing the manufacturers in question. In most cases, though, the foreign manufacturer normally appoints an agent to represent him in Malaysia.

All procurement by the airline for items worth more than M\$1,000 is done on a tender system using the airline's list of duly registered suppliers/manufacturers. On rare occasions, the procurement may be conducted on an open tender system - in which case, Malaysia Airlines will advertise its requirement in the local newspapers.

2.2 Future Plans

One of the priority areas which Malaysia Airlines has earmarked for development is the upgrading of its maintenance capabilities so that all maintenance work can be done in house. This involves the construction of a new engine workshop to overhaul and repair aircraft engines. Currently, the airlines sends its engines overseas for overhaul and repair services. With the construction of a new engine workshop, new equipment and tools, as well as technical expertise would be required and this is one possible area for Canadian participation. The new workshop is expected to be completed by 1992.

Malaysia Airlines' involvement with Canadian aviation products so far includes Twin Otter aircraft (the airline currently has five Otters which are used for its Rural Air Service), Pratt & Whitney 125B engines used on the Fokker 27s and the Pratt & Whitney auxillary power unit used on the Boeing 747-400s.

2.3 Maintenance

Malaysia Airlines' primary objective is to conduct all levels of maintenance on its own fleet of aircraft in house. However, since it is not practical for the airline to perform all overhaul work by itself, some of the maintenance work such as aircraft component overhaul is sent out house either to the manufacturer, another airline or a vendor capable of performing the job. Presently, Malaysia Airlines conducts all of its aircraft frame maintenance work on the F27, Boeing 737, Airbus 300 and DC10 aircraft in house. The airline's scheduled maintenance checks can be performed on five aircraft at any one time. The company has six maintenance docks; one each for F27, B747 and A300/DC10 combination, two 737 and one line maintenance hangar to cater to a B747.

2.4 Pilot Training

MAS will continue to send trainee pilots overseas even though there is already a flying academy (the Malaysian Flying Academy) in the country. The Airlines believes that it will benefit by having pilots trained both locally and overseas. However, the number selected for overseas training will be small compared with those undergoing local training.

Currently Malaysia Airlines has about 600 pilots, of whom 120 are expatriates recruited in the last two years to meet the shortage of local pilots in coping with the growth of the national carrier. Malaysia Airlines expects to fill up 90 per cent of its pilots posts with local pilots in the next three years and within the next five years, the company will be completely manned by local pilots.

2.5 Manpower Shortage

Due to its rapid expansion, MAS has recently run into manpower shortages across the whole range of its workforce, from cabin crew to engineers. The airline is aware of these problems and of the fact that the public perceives a drop in MAS service quality. Remedial measures are said to be in place but the exact nature of these has not been revealed.

3.0 OTHER KEY PLAYERS IN THE AEROSPACE INDUSTRY IN MALAYSIA

3.1 Malaysian Helicopter Services Bhd

Malaysian Helicopter Services Berhad (MHS) was incorporated on October 1st, 1981 with the aim of filling the gap for helicopter air transport requirements. The principal activity of the company currently is the provision of helicopter and other air transportation services to the offshore oil industry, government agencies and the private sector. The equity participation by the shareholders are as follows :

Malaysian Airline System	41.40%
Trengganu State Economic Development Corporation	31.05%
Hornbill Skyways Sdn Bhd	12.02%
Sabah Air Sdn Bhd	15.53%

Being the only local helicopter operator supporting the oil industry, MHS enjoys certain monopolistic benefits. It is unlikely that the oil corporations, which constitute MHS's existing clientele, will set up their own helicopter services. The threat of new entrants to its business is minimal due to the high initial capital outlay required and the need for relevant skilled labour. Furthermore, new entrants will be subject to scrutiny by the Government before any permit is issued (in other words, there is some degree of government protection).

MHS's aircraft inventory is summarized below :

Sikorsky S61N	7	(1 leased)
Sikorsky S76A	2	
Puma SA 330J	4	
Twin Otter	2	
HS 125-700 B	1	
Bell 412	3	(2 leased)

Total Number of Aircraft = 19

On November 3rd, 1989 MHS the company announced a C\$87 million plan to modernize the fleet over a three to five year period. This will be an on going programme to meet the increasing and technically demanding helicopter requirements. MHS purchased two additional helicopters in 1989 and may be in the market for another two medium size helicopters this year.

Some of the Sikorsky S61N's are at least 20 years old. Even though they are still operational, new regulations may render the aircraft obsolete. If the proposed regulations are enforced, MHS has a choice of either (i) modernizing and upgrading the S61N's by replacing the engines or (ii) buying new helicopters to replace them. The decision to upgrade or to replace will have to be made jointly by MHS and its clients, the oil corporations. It is important that an agreement be reached between MHS and the oil corporations since MHS will only go ahead and purchase new aircraft if the clients are willing to pay the additional premium to cover the extra cost. If the clients are prepared to pay only

a marginal premium, then MHS will have to opt for modernization of the existing fleet. Modernization of each Sikorsky S61N aircraft will cost about US\$3 million, while a brand new Sikorsky S61N carries a price tag of between US\$9 and 10 million.

In addition to its fleet modernization plans, MHS has also announced plans to diversify into general aviation activities other than scheduled air operations. This would include corporate /executive charter, executive transport to the Government and private sector, ad hoc charter, aerial photo survey, etc.

MHS currently has three fixed wing aircraft, i.e two Twin Otters which are used as utility aircraft and one B.Ae HS125-700B which is used for executive transport. For possible new executive transport MHS is interested in an aircraft such as the Gulf Stream G1. Although the G1 is considered an "old technology" aircraft, some of MHS's clients have expressed interest in it.

MHS is also interested in purchasing 19-20 seater aircraft, similar to the Twin Otter, for its operation in East Malaysia.

The King Air has also been considered as a possibility for executive jet transport. However, it is not deemed as a suitable aircraft for trips less than 200 miles on a regular basis.

3.1.1 Aircraft Parts and Engines

MHS currently deals with six main aircraft engine manufacturers, namely :

- i) Pratt & Whitney (Canada)
- ii) GEC (USA)
- iii) Allison (USA)
- iv) Garrett (USA)
- v) Rolls Royce (U.K)
- vi) Turbomeca (France) - Helicopter Engines

There is a strong possibility that MHS may acquire more Pratt and Whitney engines in the near future. The new Bell 412 helicopter which MHS took delivery of in June 1989 is powered by a Pratt and Whitney engine. As pointed out earlier MHS is in the market for another two medium sized helicopters (most likely another two Bell 412's) and there is a strong possibility that these new aircraft will likewise be powered by Pratt and Whitney engines.

3.1.2 Avionics and Related Equipment

The navigational system on the newly purchased Bell 412 is supplied by Marconi of Canada. MHS sources its avionics equipment from three main manufacturers, i.e :

- i) Collins (USA) - high frequency radio. automatic direction finder
- ii) Kings (USA) - radio transceivers
- iii) Bendix (USA) - navigation system

The company does not have any requirement for a flight simulator. MHS has only 70 pilots and since the training requirement is small, the company finds it more economical to send its pilots to Flight Safety Incorp. (USA) for flight simulator training.

3.1.3 Maintenance of Aircraft

With regard to maintenance of aircraft, MHS has the capability to conduct up to third level or hangar checks. The company's workshop has about 30-40% capacity and the company is only able to work on minor repairs. Major repairs have to be sent off shore, usually to maintenance agencies in Singapore, UK, USA, Australia, France and Canada.

Currently, MHS has a Support Service Agreement with Bristow Helicopters of U.K. for all overhaul work on major components of its aircraft (for example gearboxes, rotor blades, engines, avionics, calibration kits, etc).

Under the Agreement MHS sends all major overhaul work that Bristow is capable of handling to Bristow while all remaining overhaul work is sent directly by MHS to other maintenance organizations or to manufacturers. For example, MHS now sends the gearboxes and shafts of the S61N's to Sikorsky directly. Likewise, MHS deals directly with Allison for maintenance work on the Allison engines that are used to power the Sikorsky S-76A's. In the case of the engine in the HS125-700B, MHS has a maintenance service plan with Garrett, the engine manufacturer.

Apart from the Support Service Agreement with Bristow and the maintenance service plan with Garrett (USA), MHS is free to send its aircraft components for overhaul to the maintenance agency with the best quotation. Unlike the DCA whose procurement practice is based on a tender system, MHS keeps a list of vendors (at least two vendors for each component category) and selects the vendor with the most competitive prices. In the case of overhauling of avionics and related equipment, MHS tends to send most of its avionics equipment to overhauling agencies in Singapore where companies such as Dowty, Samaero, Samco, Garrett, Falcon, Turbomeca and Hawker Pacific are represented.

3.1.4 Procurement Practice

All procurement by MHS is conducted through its Engineering Division which is quite autonomous. Vendors are required to be registered with MHS and when particular items are required the company will call for quotes from appropriate suppliers on its list. Normally two quotes are sought. However, for certain proprietary items such as rotor blades for the Sikorsky aircraft, MHS has no choice but to source the item directly from the manufacturers themselves.

3.1.5 Tariffs

By virtue of the fact that MHS is supporting the local oil industry it is exempted from import duties on all imported aircraft and aircraft parts/components. However, imports of items involving oil, lubricants, grease and rubber material do not qualify for exemption. This is to protect the local industry (in case one day some local company succeeds in manufacturing a hose for aircraft purposes using a rubber based material, for example).

3.2 Pelanggi Air

Pelanggi Air operates a domestic airline service to supplement and complement the services of Malaysia Airlines. Pelangi is licenced to operate small aircraft with 19 seater capacity within Peninsular Malaysia.

The breakdown of Pelangi Air's major shareholders is as follows :

Trengganu State Government (Yayasan Islam Trengganu)	34%
Wira Kris Engineering	33%
Malaysia Airlines	11%
Malaysia Helicopter Services Bhd	11%
Trengganu Development and Marketing Service	11%

Pelanggi Air's fleet consists of two Twin Otters and one Dornier 228-200. As part of the company's fleet rationalization programme, it plans to replace the Twin Otters with Dornier aircraft.

Pelanggi may be in the market for an aircraft with 30-40 seater capacity in the near future to cater for the growth in domestic air travel. The four aircraft that Pelangi has considered for potential purchase are the Dash 8 (Canada), Embraer (Brazil) Saab 340B (Sweden) and Dornier 328 (Germany). Although the Embraer is new to the Malaysian market it has been well received in the USA. The de Havilland company came to Malaysia in late 1989 to conduct a demonstration of their aircraft. The Dash 8 is not viewed very positively by Pelangi as it is considered to be slow and to have relatively poor short airfield performances - an important point as Pelangi does not anticipate any extensions to the short airfields in the country in the next 10 years.

3.2.1 Potential for Canadian Suppliers

While it appears that the Dash 8 may not be the aircraft of choice for Pelangi, there is a strong possibility that Pratt & Whitney may be involved in the supply of engines as Pelangi has been very happy with the performance of their current Pratt and Whitney engines on its Twin Otters. The existing Dornier is powered by engines manufactured by Garrett and this arrangement would likely be extended to the planned purchase of the two new ones.

3.2.2 Maintenance

Maintenance work (including overhaul and repairs) for Pelangi's aircraft is done in house while the maintenance of components is usually sent to maintenance organizations overseas. The largest contract awarded for maintenance work so far is the engine overhaul contract which was awarded to Pratt & Whitney Canada in March 1988. The contract is worth US \$342,000.

3.2.3 Consultancy and Training Services

The company is aware of the training courses offered by the International Aviation Management Training Institute (IAMTI) based in Montreal. It has indicated that it may require the training services of the IAMTI in the future.

3.3 Wira Kris

The main activity of the Wira Kris Udara Holding Company involves aircraft charter service. Currently Wira Kris Udara provides a charter service to the Hydrological Department of the Ministry of Agriculture. The company also provides aerial photography, crop spraying, aerial surveys, cloud seeding and air surveillance services to the Government.

One of the subsidiary companies in the group is Wira Kris Engineering which provides maintenance service for the Police Air Units fleet of 10 Pilatus PC-6/B2-H4 aircraft. In addition to the Police Air Unit, Wira Kris Engineering also provides overhaul and engine repair services as well as test flight services to clients in the private sector including aircraft operators such as Hornbill Skyways, Malaysian Flying Academy and Sabah Air.

Wira Kris Pacific, another subsidiary of Wira Kris Udara, is the trading arm of the parent company. It currently represents 3M as an agent and supplies road signs made of reflectorized material to the Public Works Department. The company is hoping to represent more companies in future and would be interested to act as an agent for Canadian manufactures of aviation products (particularly aircraft spare parts).

Wira Kris's present aircraft fleet consists of :

One Nomad N22B (12 seater)
One Piper Aztec (6 seater)
One Bell 206B Helicopter (on lease)

The Bell 206B helicopter is used to provide air charter to clients in the Government and private sector.

3.3.1 Future Plans and Areas of Growth

One of the areas of growth which Wira Kris has earmarked for future development is air charter services. The company plans to buy an executive jet (possibly a Piper Aztec or Navajo) to meet the increasing demand for charter operations. The company recently purchased a new Dornier aircraft for C\$4.35 million.

3.3.2 Consultancy

Wira Kris Engineering recently engaged the services of consultants from Hawker Pacific to provide technical training to the company's aircraft maintenance engineers. There is a marked shortage of skilled aeronautical engineers in the local aviation industry since quite a few have migrated to countries like Canada and Australia. The company has even resorted to recruiting aeronautical engineers from countries like Burma and Nepal.

3.3.3 Procurement Practice

Wira Kris is a private company and the standard procurement practice is to call for quotations (as opposed to calling for tenders). Since the company has a small aircraft fleet, its requirements are largely confined to consumable spares. The purchasing of spare parts required for the Air Police Unit's Pilatus aircraft is done by the Air Police Unit itself.

3.4 Airod

Airod Sendirian Berhad is a joint venture company set up in 1985 between Aerospace Industries Malaysia (AIM) and Lockheed Aircraft Services International (LASI). AIMS shareholders are the Government of Malaysia (the Ministry of Defence), Malaysia Airlines and United Motor Works.

The company has depot level capabilities covering the areas of aircraft maintenance and overhaul; engine and components overhaul; aerocomponents overhaul and repair; and avionics and electronics calibration and repair. The capabilities of Airod can be summarized as follows:

Aircraft Division

- Depot Level Maintenance
- Corrosion Control & Repair
- Strip and Paint
- Sheet Metal Structures
- Fabrication
- Fuel Cells/Fuels Tanks
- Refurbish
- Modifications

Engine Division

- Overhaul
- Inspection: Visual and Dimensional
- Test Cell: Turbo, Turbo shaft
- Reciprocating
- Non-Destructive Testing
- Chemical Cleaning
- Electro-plating
- TIG Welding
- Flame Spray
- Fuel/Oil Components and Accessories

Avionics Division

- Generator Systems
- Ignition Systems
- Starter Motors/Actuators
- Electric Cable Harnesses
- Hermetically Sealed Instruments
- Calibration
- Electronic Equipment/Components
- Gyros/Comm/Nav Equipment
- Life Support Equipment

Aero Component Division

- Overhaul / Repair
- Accessories / Components
- Landing Gear System
- Wheel & Brake System
- Airconditioning System
- Propellers
- Transmissions
- Gear Boxes
- Rotor Heads
- Actuators
- Pneudraulics Systems

Ground And Air Communication Systems

- Design
- Install
- Training
- Furnish
- Maintenance
- Secure Communications

3.4.1 Aircraft Division

The Aircraft Division performs depot level maintenance, inspections, modifications, refurbishment, corrosion control, repair and operational checks for fixed wing, cargo, fighter, transport and rotary wing aircraft. Aircraft currently serviced by the Division include:

- . Hercules C-130 - US, Royal Malaysian and Kuwait Air Forces
- . F 28s - Air Niugini
- . Alouette III - Royal Malaysian Air Force
- . A4s
- . DHC-4 Caribous
- . Bell 200 series
- . Sikorsky S-61s
- . F 5s - Bahrain Air Force
- . F 16, F 4's - US Air Force

3.4.2 Engine Division

This Division is equipped to undertake the overhaul, inspection, repair and testing of turbo jet, turbo shaft and reciprocating engines and their related accessories. A major part of the Engine Division's present activities is the overhauling of General Electric and Turbomeca engines and their components. The division is expanding its overhaul activities to cover more engine types.

3.4.3 Aero Components Division

The Aero Components Division carries out overhaul, repair and functional testing of gearboxes, transmissions, hydraulic systems, landing gear systems, airconditioning and all their related components and accessories for fixed and rotary wing aircraft. The Division's capabilities are being extended to include the

overhaul and repair of helicopter rotor blades, aircraft propellers and a wide range of hydraulic components for commercial and military aircraft.

In 1989, Airod signed a contract with Lockheed Aircraft Service Company and Triex Group International, USA, to manufacture, assemble and test airfield lighting systems for civil and military applications. The systems, to be produced by Airod under licence, are the Visual Approach Path Indicator (Vapi) and the Site Identifier (Sident).

3.4.4 Avionics Division

The Avionics Division performs repair and maintenance work for civil and military avionics and electronic equipment. Another service offered by the Division to aerospace and other customers is the calibration and repair of electronic and mechanical Precision Measurement Equipment (PME).

3.4.5 Total Quality Control

Airod's total quality control adheres to the quality requirements and specifications of:

- the Royal Malaysian Air Force
- the U.S. Department of Defence MIL-Q-9858A
- the North Atlantic Treaty Organization (AQAPS)
- the Malaysian Department of Civil Aviation
- the U.S. FAA - UK CAA
- Lockheed corporation

4.0 MALAYAN RAILWAY OR KERETAPI TANAH MELAYU (KTM)

4.1 Privatisation of KTM

The Malaysian Government has plans to privatize KTM with the formation of a government owned corporation as the likely first step. The Ministry of Transport has proposed that a company called Syarikat Keretapi Tanah Melayu be created with the following four divisions:

- i) Track and Operations
- ii) Freight
- iii) Passenger and
- iv) Workshop,

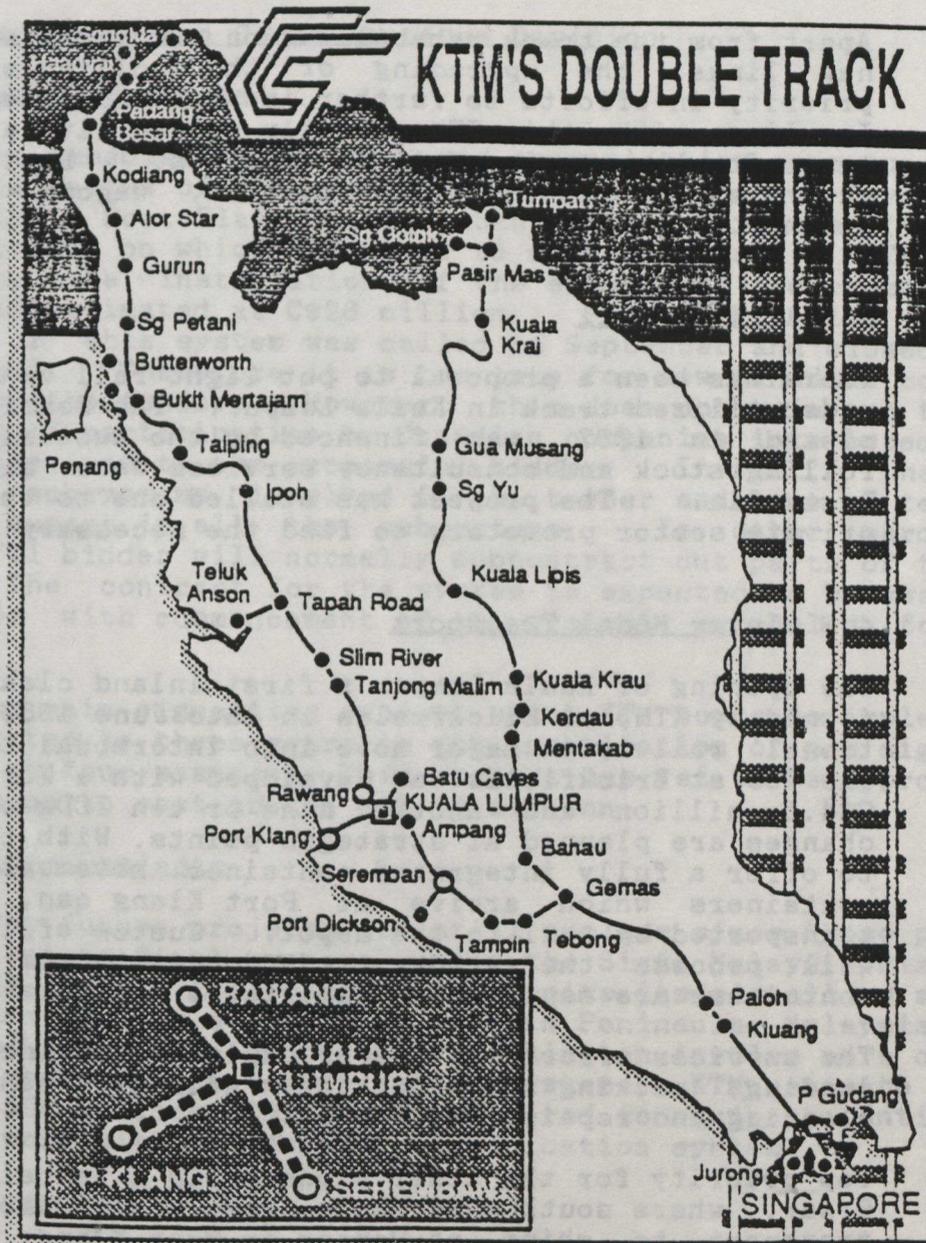
each of which would function as separate entities. According to the plan, the Freight and Passenger Divisions are to run the main operations under a contract arrangement with the Track Division. The Track Division would be regulated by the Ministry of Transport or an independent authority. A corporatised KTM would still be 100 per cent owned by the government, but would be operated on commercial lines guided by the profit motive. The new company has to be financially independent and generate its own revenue to sustain itself without relying on government grants for funds. However, at this time there is no schedule for implementation of the proposed corporation.

There is some concern that the private sector does not have the expertise to run a railway, a very specialised mode of transport. Industry sources believe that foreign parties which have experience in rail management may form consortiums with local firms which take up the offer to run KTM (Malaysian Business, May 1-15, 1989). The deciding factor is simply how lucrative is the return on investment. For KTM, there are big question marks on cost control and high staffing levels. Further, on the revenue side, more earnings depend on more capital investment to reduce travelling time and so compete with the road network which is being upgraded. For example, it is estimated that to cut the KL to Singapore travelling time to only 2 1/2 hours from the present 6 hours would require an investment of over C\$1.1 billion. This involves the purchase of faster trains, upgrading track and modernisation of the signalling and communications equipment.

4.2 KTM's Future Projects

In August 1989, KTM announced that it will spend M\$500 million (C\$217m) to lay double tracks for two heavily trafficked stretches between Kuala Lumpur and Port Klang and between Seremban and Rawang as depicted in Figure 2. The additional track is to allow KTM to expand its cargo and passenger services. The earliest by which construction could start on the tracks is late 1990, giving a completion date of late 1992 or early 1993. According to the Minister of Transport, the twin track system will eventually be implemented throughout the country with timing based on the financial position and traffic demand.

Figure 2:



KTM also plans to increase the number of railbus services between Sentul (in Kuala Lumpur) and Port Klang. The project cost is estimated at about C\$65 million - C\$9.5 million for the upgrading of the existing track, C\$44 million for the laying of double tracks, and much of the balance for modernization of the signalling system along the 52 km route.

Consistent with these plans, it was announced on March 23rd, 1990 that KTM would receive a loan of approximately C\$147 million from the Overseas Economic Cooperation Fund of Japan. The money is to be used to rehabilitate track; for the double tracking of the

Kuala Lumpur - Port Klang and Rawang - Seremban sectors; to modernize signalling and communications systems; and to buy diesel multiple units.

Apart from the track rehabilitation programme and construction of new links, the upgrading of the rolling stock is also given priority in efforts to further improve and modernize the system. In line with this KTM recently signed with a Canadian manufacturer for the supply of 12 locomotives. Further international purchases of locomotives, coaches, wagons and railbuses are planned.

4.2.1 Light Rail

There has been a proposal to put light rail vehicles on existing underutilized track in Kuala Lumpur. The feasibility study, completed in 1987, was financed by the Australian government and rolling stock and consultancy services were also to come from Australia. The project has stalled due to the inability of the private sector promoters to find the necessary equity capital.

4.3 Inter Modal Transport

The opening of Kuala Lumpur's first inland clearance depot (ICD) (owned by KTM) at Brickfields in late June 1989 signalled the national railway's major move into intermodal transport business. The ICD at Brickfields was developed with a World Bank loan of C\$4.5 million and another nine or ten ICDs or road-rail interchanges are planned at strategic points. With the ICDs, KTM plans to offer a fully integrated container movement service whereby containers which arrive at Port Klang can, on unloading, be transported by rail to the depot. Custom officials at the depot will process the various trade documents and once cleared, the containers are sent to the importer's premises.

The services offered at the Brickfields ICD include loading, unloading, packing and unpacking, storage, container inspection, clearing and repair.

Top priority for the other planned ICD's is being given to Padang Besar, where southbound Thai cargo is consolidated for rail transport to ships at Penang or Port Klang; to Ipoh where two truck companies will assist KTM in developing door-to-door services via this strategic interchange, and to Johor Baru to serve the booming industrial area and port there.

Meanwhile, in an attempt to ensure greater efficiency of the inland haulage systems generally, the Ministry of Transport commissioned the US based Stanford Research Institute to conduct a study to identify weaknesses. A draft report has been submitted and reviewed and the final report is due at the end of March, 1990. The study began in October 1989.

The total number of twenty foot equivalent unit containers (TEUs) handled by KTM has increased by some 88 percent in 1988 to 78,784

TEUs from 41,806 TEUs in 1987. For 1989, KTM estimates a further growth of about 12 percent.

4.4 Signalling and Communications Division

a) Current Projects

The most immediate signalling and communication opportunity, is the installation of the signalling and communication system for the K.L. - Port Klang and Seremban -Rawang stretches (these are the stretches on which KTM plans to double track). The total cost for the installation of the signalling and communication system is estimated at C\$26 million. Prequalification for the supply of this system was called in September and closed in October 1989. Therefore it is too late for new Canadian companies to bid on the tender. However, this does not rule out the possibility of participation by Canadian companies interested in offering services to the successful bidder. In fact, there are several subsystems involved in the tender and none of tenderers will be expert in all the subsystems. In other words, the successful bidder will normally subcontract out parts of the system. The contract for the system is expected to be awarded in mid 1990, with commencement of the project scheduled for late 1990.

The other main signalling project which KTM hopes to implement in the next two to three years is the installation of new signalling systems at four stations. This project has yet to be approved and is expected to cost around M\$2.75 million.

b) Future Projects

Plans for future projects are still unclear since these projects are subject to final approval under the Sixth Malaysia Plan. In the long term, KTM plans to modernize its signalling and communication systems over a wide area in Peninsular Malaysia. The projects that KTM is currently working on involve more of signalling systems than communication systems. KTM estimate that at least M\$500 million (C\$217m) is required to equip the entire KTM rail network with an adequate communication system.

c) Competitors

The market leaders in the supply of rail signalling systems are M.L. Engineering and Westinghouse, both of U.K. Other manufacturers of rail signalling system who have supplied to KTM include Integra of Switzerland, Siemens for Germany and Kyosan from Japan. There has been very little representation from U.S.A. and Canada so far. Only one Canadian company, Canac International Incorp., submitted a bid for the prequalification tender mentioned earlier (the signalling and communication system for the double track stretches).

d) Consulting

In 1989 KTM enlisted the help of Canadian Pacific Consulting Services (CPCS) to delineate its existing cost structure to pave the way for its privatization i.e. to review sectoral cost centres. The CPCS team, which was in Malaysia for 17 weeks, defined cost centres, determined their functions and identified services to be offered.

e) Knowledge of Canadian Products

When asked for his opinion on Canadian products, Mr Paranchothi, the Deputy Director of Signals and Communication, remarked that he has visited some of the rail signalling equipment manufacturers in Canada and he believes that Canadian products are of superior quality. However, Canadian manufacturers lack a presence in Malaysia and as such very little is known of their capabilities, products and services. In agreement with the majority of the contacts interviewed for this study, Mr Paranchothi stressed that the Canadians should take an effort to make themselves more visible in the local market. He added that their products must be priced competitively.

f) Procurement Practice

It is standard practice for KTM to call for tenders for all of its purchases. Within KTM, there is a railway board committee whose function is to evaluate both the technical and financial aspects of tender bids. This committee comprises representatives from the Treasury, the Ministry of Transport and KTM itself.



5.0 PORTS

The volume of container traffic at Malaysian ports has grown considerably in recent years and in response to this the Ministry of Transport - Ports Division has identified four major port expansion projects:

1. Port Klang Expansion Project

This project is expected to cost about C\$200 million and involves the building of a new port at Pulau Lumut which will be considered as part of Port Klang. Currently there is very little infrastructure in Pulau Lumut and therefore civil works (ie. building of roads and bridges) will form a large part of the project. The project is expected to be completed in five years time and will be financed jointly by the World Bank, the Government and the Port Klang Authority.

2. Penang Port Expansion Project

Under this project, a new container terminal is to be built on reclaimed land at a cost of C\$125 million. Short listing of suitable contenders for this project has been completed although tenders have not yet been called. Funding is to come from Penang Port reserves along with local bank financing.

3. Johore Port Expansion Project

The Ministry of Transport has approved the construction of a new multipurpose wharf at Johore Port at a cost of over C\$50 million. This project was previously approved, than put on hold due to the economic recession. It was revived again in the middle of 1989 and will most likely be financed by a commercial loan.

4. Construction of Perlis Port

The proposed C\$30 million Perlis Port will have passenger, cargo and fish loading terminals. The project is currently under active consideration by the government. Once the go ahead decision is given, it is estimated that the Port can be constructed and operational within two years.

Foreign input for these types of projects is usually sought in four areas, namely:

- i) Design of terminal
- ii) Engineering aspect
- iii) Initial planning of civil works
- iv) Supply of equipment such as cranes

The Port Authorities themselves will call for tenders and in the case of major tenders the Authorities will inform foreign embassies that tenders are to be called.

The Government plans to eventually privatize the management of Port Klang, Penang Port, and Johore Port. The respective Port Authorities will still exist but each of the ports will be managed by a private company. Port Klang privatized the management of its container handling to Kelang Container Terminal (a local joint venture with P & O Australia) in 1986. Each of the ports has completed its own study to determine the best way to handle the privatization process.

5.1 Klang Port Authority

5.1.1 Foreign Participation

The foreign companies that are strongly represented at Port Klang include those from the USA, Germany, Finland, Japan and the U.K. Examples of equipment that has to be sourced from abroad include the normal type cranes (i.e. cranes able to lift between 5 to 25 ton load), container cranes and heavy lift forklifts (capable of lifting 10 to 22 ton load).

5.1.2 Canadian Involvement

To date the Klang Port Authority has not received any business calls from Canadian manufacturers/suppliers and Canadian capabilities in the industry are not known.

5.2 Future Projects

The major areas of growth and future purchases/projects for the next two to three years which have been identified by the Klang Port Authority are:

- i) Purchase of C\$8.5 million worth of plant and equipment. This will include the purchase of marine tug boats. No action has yet been taken on the project.
- ii) Modification of the existing wharf to cater for container operations. This project has not been tendered and is expected to cost about C\$6.5 million. The British firm, Coote and Partners, has recently been appointed to undertake the design work for the modifications.
- iii) Dredging of the northern and southern sea approach. This project is worth C\$2.4 million and is scheduled to commence in late 1990. Tenders for this project are expected to be called by mid year.
- iv) Purchase of two container cranes which are expected to cost C\$25 million collectively. These cranes will most likely be purchased by the privatized company since the Government plans to privatize Port Klang by June/July 1990. To date, no action has been taken regarding the proposed purchase.

5.3 Procurement Practice

For procurement of equipment and services the Port Authority has to go through a tender system in accordance with standard Government procedures. However, once Port Klang is privatized it is up to the private company to form its own procurement practices.

5.4 Import Tariffs

The Klang Port Authority is not a Government body in the true sense. As a quasi Government body it is subject to import duties and it also has to pay income tax.

6.0 PROTON

Malaysia has its own car - the Proton Saga - which is built with 60 percent domestic content. The car is based on a Mitsubishi model and has been in production since 1986. The Malaysian government owns 70 per cent of the company and Mitsubishi owns the rest. Mitsubishi currently supplies much of the senior management, including the Chief Executive.

The company employs 1,600 people with 700 of these in manufacturing. It has a very impressive stamping operation, utilizing the most modern equipment including robotics and automated handling. Current annual output is about 80000 units from two shift production.

Presently a considerable volume of parts is being imported and the company's most important objective is to localize this production. Part of the problem will be to find moulds and machinery capable of moulding the various parts required. For example, a 1,600 ton moulding machine is required to mould the instrument panel and only one such machine is available in Malaysia. Therefore there is a good potential for Canadian automotive manufactures to market their technology, machines and moulds for the manufacture of Proton Saga parts. Proton is also about to start assembling engines in its plant. Currently all engines are imported from Japan. The company's goal is to eventually source the engine parts from Malaysia in order to complete the domestic content program.

In order to achieve higher local content, Proton will require the technical assistance of foreign manufacturers, either in the form of a technical assistance agreement or joint venture operations. The company welcomes participation from any party interested in providing the necessary technical assistance that will enable the company to manufacture automotive parts locally.

Thus there is a good market potential for Canadian automotive parts manufacturers wishing to enter the Malaysian car manufacturing industry.

In 1988 Proton engaged the services of a consultant from the USA to search for alternative sources for automotive parts and components that the company now sources from Japan. In the study, the consultant made reference to the Canadian automotive parts manufacturing industry. Proton therefore has some background knowledge of the capabilities of Canadian companies in this industry sector and this was enhanced when discussions were held with members of the Canadian Automotive Parts Manufacturers Mission when they visited Malaysia in April 1989.

6.1 Areas of Potential Canadian Involvement

The two main areas of automotive parts manufacture for which there is good potential for Canadian involvement are:

- 1) metal fabrication
- 2) moulds and dye making

There is much less opportunity in the plastic parts and electrical/electronic areas since there is good local support available from companies such as Bosch, Lucas, Mitsubishi and Nippon - Denso.

The automotive parts that Proton is particularly keen on manufacturing locally include specialized items such as axles, brakes, drive shafts and steering columns.

7.0 ROADS

7.1 North South Expressway

Construction is currently underway on a 750km, C\$2 billion expressway running down the west coast of Peninsular Malaysia. When complete, it will link Singapore in the south to the Thai border in the north.

The expressway is a privatized closed tollway being constructed and operated by Projek Lebuh raya Utara-Selatan (PLUS). About half of the expressway is complete and in operation and contracts have been let for the outstanding sections remaining. Foreign involvement in the North South Expressway project has included:

<u>Foreign Companies</u>	<u>Main activities</u>
- Taylor Woodrow International	Construction management
- Morgan Grenfell and Comp. Ltd	Financial services
- Transroute (Technical Advisory to PLUS)	Operations and development
- Sir William Halcrow and Partners	Civil works - geotechnical
- Acer Freeman Fox	Mechanical and electrical
- Halcrow Fox and Associates Ltd	Traffic study

As can be seen from the companies listed above, foreign participation is dominated by British companies.

As far as consultancy services are concerned, it is now too late for Canadian companies to enter the market. However there may be some opportunities for Canadian companies in construction and supply of equipment such as toll equipment, emergency equipment and lighting services. Canadian manufacturers interested in supplying their equipment should write directly to PLUS to express their interest.

7.2 Malaysian Highway Authority Projects

The MHA is in the process of designing the Shah Alam Highway and the North-South link to join the norther and southern leg of the North-South Expressway. The design is expected to be completed in July/August 1990, at which time the MHA will invite submissions for privatisation bids, most probably on a build, operate, transfer basis.

The MHA is presently in the process of formulating the projects to be undertaken under the Sixth Malaysia Plan. One of the priority projects is the construction of several tunnels going to Genting Highlands. At present, there is only one tunnels and the two-way traffic has created problems with ventilation. Other future projects under the Sixth Malaysia Plan include improvements to existing roads/facilities and the construction of new roads/facilities.

APPENDIX A

PRINCIPAL CONTACTS

I Principal Contacts Interviewed for This Study

1) Department of Civil
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4) Capt. Abd Shukor bin
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5) Capt. Tan Check Hong
Snr Assistant Director
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4) Wira Kris

Contact: Encik Zulkifli Jaalam
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5) Malaysian Helicopter
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Contact: Encik Ma'som Mahadi
Corporate Controller
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