

CHAPTER 1

CHAPTER 1

BACKGROUND OF THE STUDY

1.1 INTRODUCTION

This chapter provides an overview of the changing scenario in the management of warfare as a result of development in defence technology. It begins with the discussion on the elements, which make a nation powerful and is able to protect its security and sovereignty. The development of local defence industry is highlighted in an effort to emphasise the extent of national ‘self-reliance’ programmes and the involvement of local companies in defence related venture. It also dwells into the characteristics of modern warfare where speed, firepower and information gathering are important war winning factors. In achieving speed, the manoeuvrability of war machines like tanks and armoured vehicles will inevitably decide the outcome of a battle. Here, too, the writer looks at the development of automotive industry in the country and the roles played by the industry in providing the state of readiness of the army. The feasibility of converting and integrating military and commercial technologies is discussed at the later part of this chapter. Finally this chapter explains the objectives and methodology in conducting the study.

1.2 MILITARY AND TECHNOLOGY AS ELEMENTS OF NATIONAL POWER

The ability of the nation to pursue its interests depends on the power it can generate in several discrete areas. National power is therefore, a function of the strength of these areas. In the industrial age national power has been seen as comprising several distinct yet interdependent elements. Each of these elements comprises a multitude of complex organisation and characteristics. The national power model is depicted in figure 1.1.

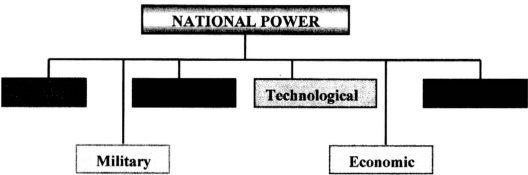


Figure 1.1: The National Power Model

While each of the elements remains an important contributor to national power in its own right, the individual element will be influenced by the increasing role technology will play in society. Arguably the strength of a nation's technological capabilities should be embedded in each of the elements.

Military capability is the ability to generate and sustain combat power. It is defined as the capabilities to maintain a formidable force at a high degree of preparedness. The force contains the people, weapon systems and support structure. Preparedness denotes the ability of a military force to undertake and sustain operation within a defined timeframe

1.2.1 The Pillars of Military Power

The traditional model of military capability does not explicitly recognise that the effective application of this capability relies on several additional factors such as strategy, doctrine and most importantly technology. To remedy this situation, the Australian Defence Forces propose a model known as the **Pillars of Military Power** (*Christ Westwood, 1998*). The aim of military power model is to identify those elements which must be present, and their relationships, for a "strategic fit" to be achieved. Just like in corporate environment, the military planners must ensure that their forces can meet future threats. This is achieved by conducting an environmental analysis through consideration of likely strengths, weaknesses, opportunities and threats within the internal and external environments of the future. Using political and budgetary guidance, strategic planners must then identify and implement change programmes in an attempt to move the military forward and ensure that the military force that is raised meets the strategic

requirements of any given point of the future. The Australian Defence Force Model of military power (Pillars of Military Power) is shown in figure 1.2.

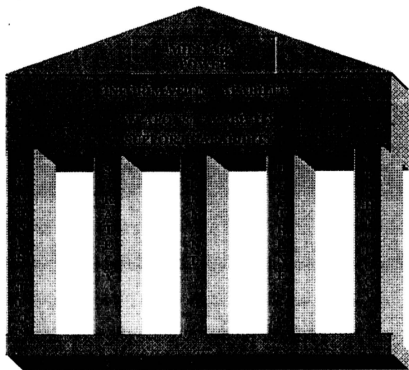


Figure 1.2: Pillars of Military Power

An analysis of the five pillars shows that they shape and influence the military power of the nation. A comparison with the traditional elements of national power demonstrates a common element that appears in both models – technology. Technology is seen as an important factor in the development of a nation, in shaping the life of society and in changing the dimension of warfare.

1.3 DEFENCE INDUSTRY SUPPORT

The development of the local defence industry began in the late sixties with the setting up of Syarikat Malaysia Explosives Sdn. Bhd. in 1969. This company was involved in the production of small arms to cater to the needs of the armed forces. At the same time, various in-house facilities were established, geared towards the individual needs of each branch of the MAF. Examples of these include the RMAF Aircraft Repair and Overhaul Depot (AIROD), the Naval Dockyard in Lumut and various other facilities within the MAF.

The rationale for the development of the local defence industry is to achieve a certain degree of self-reliance, primarily to make available the necessary spares and weapons and to maintain the operational readiness of the MAF at all times. Apart from being able to achieve self-reliance, some of the benefits that can accrue from a well-developed defence industry include reduction of imports, thus saving foreign exchange, reduction in defence expenditure by the extension of the life span of military equipment through modernisation and refitting. Another aspect of importance is the technological spin-offs, which can contribute to the overall industrialisation of the country.

Over the years, a number of production and repair facilities have been set up by the private sector. These capabilities include the production of arms and ammunition, assembly of soft-skinned vehicles, assembly of light trainer aircraft and the manufacture of aircraft parts and components, assembly of communication equipment and the construction of ships. Another capability of the defence industry is the maintenance and refurbishment of vehicles, ships and aircraft.

In tandem with the nation's industrial master plan, defence industries are focussing on dual-use technologies while thriving to develop high technology industries. The future direction of defence industries will be in expanding the scope of capabilities in aerospace, shipbuilding, automotive and electronics and software development.

To promote the development of defence industry, it is the policy of the government to tie procurement of capital equipment to transfer of technology activities under offset programmes. Through these programmes the government is able to assist the defence industries to acquire technologies which are difficult and expensive to obtain. Offset activities include transfer of technology, training and technical assistance, buy back arrangement, licensed production and joint-production. Recent purchases of aircraft, ships, armoured fighting vehicles and weapon systems have generated a certain degree of technology transfer to local industry and research institutions.

Some of notable offset activities gained through the purchase of military equipment are the acquisition of Rapid Prototyping and High Speed machining technology by SIRIM and training in advanced materials, missile guidance system and shipbuilding and repair.

MAF require a large and diverse infrastructure to sustain the operational effectiveness. The goal of encouraging the development and maintenance of capabilities are as follows:

- To develop specific capabilities that are considered to be strategically important for sustaining the defence of the country including modification, adaptation and through life support of key assets.
- To broaden the capability and capacity of defence industry infrastructure to enhance self-defence.

With the implementation of the offset programmes, defence procurement acts as a major source through which industry skills and capacity to provide these capabilities can be developed and enhanced. It is therefore incumbent upon the defence-related companies to maximise the opportunities available through the offset programmes to acquire new skills and technologies.

Very few developing countries manufacture armoured vehicles and tanks. China manufactures tanks for its own use, while Brazilian, South African and Korean products do not sell well in international markets. Korean's infantry vehicle, manufactured by Daewoo for instance, obtained the manufacturing license from the American manufacturer and has Malaysia as the only customer.

Soft-skinned vehicles play a supporting role in providing troops transportation, carrying combat supplies and other administrative movements. It is in this area that the Malaysian automotive industry can provide the required vehicles to the Armed Forces, thus reducing the over dependence on foreign manufacturers to deliver the goods. As the military combat requirement is considerably higher than the commercial requirement, it is incumbent upon the local automotive industries to harness their technological capabilities to enable the country to be more self-reliance in term of military hardware.

1.4 THE IMPORTANCET OF VEHICLES IN LAND FORCE OPERATIONS

Since the use of tanks in battlefields, land warfare had experienced an ever-increasing application of technology in military hardware. The glorious bravery of foot soldiers had been replaced by the roaring sound of main battle

tanks with large caliber weapon systems, and fast and swift mobility. The armour protection of the vehicle makes it a safe transportation for the foot soldiers to seize the initiative over the enemy.

Combat operation will not be successful without the support of the other elements of land troops such as supplies, maintenance and medical services. The provision of these services is made possible with the use of soft skinned vehicles, normally known as logistics vehicles. The importance of these two types of vehicle is discussed below.

1.4.1 Logistics Vehicles

Throughout the history of warfare, it is evident that logistic support is very vital in sustaining the fighting force. Logistic in military term deals with movement of resources to support combat troops in war. It includes transportation and supply of ammunition, ration, maintenance of equipment and the provision of medical services in the field. The part that logistic plays can be illustrated by the following extracts from General Eisenhower's report on operations in Europe during World War II :

" As will be indicated in due course, the difficulties of supply eventually forced a halt upon us when we reached Germany, but the very rapidity of our advance across France had made that inevitable in consequence of the enemy's denial to us of the Brittany port and the unexpected situation of having to

support a dash of such length and speed entirely from our own bases on the Normandy shore, only a miracle of hard work and brilliant improvisation of the supply services had carried out our armoured spearhead so far".

"In the struggle, it was his logistic inability to maintain his armies in the field that the enemy's fatal weakness lay. Courage, his force had in full measure, but courage is not good enough. Reinforcement failed to arrive. Weapons, ammunition and food alike ran short and the dearth of fuel caused their powers of tactical mobility to dwindle to the vanishing point."

(Australian Army Logistics Doctrine, 1999)

Traditionally, heavy-duty cargo trucks and many other assortment of specialised vehicles (fuel tankers, water bowzers, field ambulance and recovery vehicles, for example) are utilised to provide the logistic supports. The capacity ranges from 3 tons to about 20 tons, depending on the function of the vehicles. The main role of these vehicles is as troops and supplies transporters. During the era of communist insurgency, 3-tonne trucks were heavily utilised along the Malaysia-Thailand borders to insert and extract troops involved in combat operations. These vehicles proved to be reliable and very durable in the rugged Malaysian terrain.

In peacetime soft-skinned vehicles are used as unit's logistic and administrative vehicles. The maintenance task is carried out by technically

trained personnel of the Royal Electrical and Mechanical Engineering Corps (REME). The organisational structure of the Corps is well dispersed throughout the whole hierarchy of the army organisation to provide intimate support to combat and non-combat units. The mechanics at the unit level are able to maintain the vehicles up to component repair. Any service beyond is channelled to the army's divisional workshop and the Armed Forces Central Workshop, which is located in Kuala Lumpur.

1.4.2 Combat Vehicles

Armour protection has played an important role in warfare for the past three millennium. Use of body armour was evident in the world military tradition. In 600 BC, the Greeks developed sophisticated bronze body armour, single-piece bronze helmet, and shin greaves. Roman legionnaires were protected by body armour made of individual iron hoops that were hinged at the back and clasped at the front. Ancient Chinese also used body armour, which was a suit of overlapping rectangular leather plate, sewn to a wool mantle. The Japanese later adopted the Chinese armour and military forms in about the sixth century (Cowley, 1996).

The term armour today describes military units composed of tanks, armoured infantry carriers, reconnaissance vehicles, and armoured, self-propelled artillery pieces. Modern armoured warfare began in the First World

War (WW1) when the American invention of the caterpillar tractor was integrated to the armoured car and given high-caliber weapons. The British and French also used the tanks in WW1, providing a technological solution to the tactical impasse imposed on warfare by defensive weapons and tactics. The combination of mobility, armour protection and firepower continues to be the hallmark of armoured vehicles and units.

The Second World War (WW 2) demonstrated the might of tanks and armoured vehicles in deciding the fate of many battles. These "mean machines" possess tremendous tactical advantages in terms of manoeuvrability, firepower and protection. They provide the platform for weapon systems with devastating effects and the speed and adaptability to terrain provide commanders with various options under various tactical situations. In the Korean War, American infantry units were at the mercy of North Korean tanks until American tank units were rushed to the peninsular to protect them. The Arab-Israel wars of 1948, 1956, 1967 and 1973 reconfirmed the value of tanks and armoured vehicles in winning the war.

The Malaysian Army first used the armoured vehicle during the emergency period in the late 1950s. It had Ferret Scout Car and Panhard in its inventory to conduct reconnaissance and escort tasks. The rugged Malaysian terrain, with thick undergrowth and soft soil in many parts of the country reduced the usage these wheeled vehicles to tarred roads and cross-

country logging tracks. In the late 1960s the vehicles slowly began to be phased out as the strategists felt the ageing machine had over-performed its share of duties and needed to be replaced with more lethal and higher mobility armoured vehicles.

The modernisation and expansion of the army, which started in 1980s, saw the addition of many other armoured vehicles in its war assets. These include the USA-made Commando 150, RPZ Condor (Germany), Sibmas armoured fighting vehicle (Belgium), Korean Infantry Vehicle (Korea), United Kingdom's Scorpion and Stormer light tanks and the latest Acv 300 armoured personnel carrier from Turkey. To-date, the Malaysian Army has not possessed main battle tanks in its inventory.

Beside providing security coverage and other operational tasks along Malaysia – Thailand border during the height of communist threats in the 70s until late 80s, Malaysian army's fleet of armoured vehicles were also deployed under the United Nation's missions in Cambodia, Namibia and Bosnia Herzegovina. The one incident that will go into history is the "Bakara Market" incident, in which a Malaysian mechanised troop was involved in the rescue operation to release the American Rangers held captive by the warring faction in Namibia. In the operation, 12 armoured vehicles were deployed and in the ensuing ambush by the rebels, a soldier was killed, 3 seriously injured while 3 vehicles were completely destroyed.

The REME technicians also conduct maintenance tasks for armoured vehicles. REME workshops are established in the Armoured and Mechanised Regiment to provide intimate support. The mechanics are given adequate training at the Army Institute of Engineering in Port Dickson. A significant number of them were selected to attend maintenance training at the manufacturers' plants under the transfer of technology arrangement. They are capable of undertaking repairs up to component level. Overhaul and refurbishment jobs are carried out at the Armed Forces Central Workshop in Kuala Lumpur.

In 1986, the government, under the privatisation programme, awarded a contract to modernise a fleet of Commando V150 armoured vehicles to Syarikat Malaysian Mining Corporation-Engineering. The involvement of this public listed company marked the beginning of the concept of sourcing out of services to the private agencies to overcome shortage of trained personnel.

Over the years the world has witnessed greater technological development in tanks and armoured vehicles. Bigger caliber weapons are mounted on the vehicle, radar and computers are added to the whole integrated weapon systems and detection is made more difficult by having the Infra-red reflector (IRR) painted to the body of vehicles. Greater emphasis on

ergonomics has made the vehicle more comfortable and easy to drive and operate

Military technology is currently undergoing phenomenal changes that result in significant shifts in the mix of armoured team. The emphasis among Western nations on keeping casualties low will ensure that the army continues to use armoured vehicles to protect soldiers. This was evident in the NATO deployment of armour in Bosnia in the 1990s. Heavy tanks combining high speed, tremendous protection, heavy firepower and digital battlefield arrays were then used. These vehicles were equipped with thermal-imagery sights and driving devices that eliminate the visibility difference of day and night, giving the armoured task force a dramatic advantage over dismounted infantry. With such technologies, armoured units will continue to provide an efficient means of conducting military operations.

During his official visit to Poland in April 2002, the Prime Minister announced that Malaysia would purchase main battle tanks from the host country to boost its defence capabilities. The announcement was met with much enthusiasm as the army has been waiting for long to acquire the vehicle. Prior to this, the government had signed a contract for the supply of large number of armoured personnel carriers. The planned purchase of the main battle tanks had added a new dimension to the war-fighting capabilities of the Malaysian Army

1.5 DEFENCE POLICY – TOWARDS SELF- RELIANCE

As an independent and sovereign state, Malaysia has to preserve its national interest and security. The pursuit for self-reliance involves not only within the organisation of the defence forces but also the whole spectrum of national resources including local industries. It should have the capacity to act independently without external help, both in terms of manpower and equipment required to defend the nation. In this respect the local industries are expected to be able to provide the impetus for the development and production of defence equipment. This had already taken place with the development of local defence industry, which began in late 1960s, with the setting up of Syarikat Malaysia Explosive Sdn. Bhd in 1969. From a humble beginning, the industry had progressively expanded over the next three decades with more local companies getting involved in the defence sector. However, most of the participation is limited to providing the maintenance services and acting as local agents for foreign principal equipment manufacturers.

The end of cold war in 1989 had shifted the focus of nation states on conflicts. The global military power has become unipolar, with only the United States and its allies asserting their military supremacy. MAF also had its emphasis shifted from Counter Insurgency Warfare (CIW) to Conventional

Warfare (CW) setting, where the war fought is equipment-intensive rather than man-intensive. In view of this development, the strategists and politicians feel that there is an increasing need for Malaysia to formulate a defence policy that answers the contemporary requirement of the nation. One of the elements of defence policy formulated in 1982 is the desire to be "self-reliant" in protecting the sovereignty of the nation. It calls for concerted effort in the defence of the nation from all quarters. The policy stresses that the preservation of sovereignty rests not only on the shoulders of the security forces but all able-bodied citizens. Beside the manpower requirement, industrial sectors are also required to contribute in term of providing the equipment and weaponry, without having to rely on foreign weapon producers.

Modern military equipment is assemblies of complex technological innovations, integrated to perform specific tasks with versatility. The combination of materials, electronic optical, mechanical, chemical and other technologies are involved in the evolution and fabrication of state-of-the-art military hardware. Understanding modern military hardware requires a high degree of technological knowledge in order to assess its performance, reliability, durability and maintainability. Mastering science and technology, and developing capability, therefore, are essential criteria in achieving defence self-reliance. In meeting these criteria, the industrial sectors can play a leading role in enhancing the defence technological capability.

Broadly speaking, it is not essentially technology that the military seeks: it is the capability. The technologies applied to military weapon systems are for the purpose of increasing the warfighting capability in terms of accuracy, range, mobility, fatality and information gathering. The technologies represent those catalytic agents, which enable a nation to build military systems that will provide enduring capabilities for the armed forces. Taking advantage of the technological capabilities of Malaysian commercial industrial sectors, the Malaysian Armed Forces should exploit the potential of local industries to develop the nation's defence technological capabilities. With no imminent threats foreseen in the immediate future, there will be limited funds for the Armed Forces to develop the capability alone. There will be more exploitation of commercial off-the-shelf products, because a lot of this war-winning technologies is being developed at high speed by the commercial sectors for application in civil areas. There will be less reliance on military specification and there will be more evolution in capability once the equipment is in service.

1.5.1 Malaysian Automotive Industry

The development of local automotive industry can be divided into two phases. The first phase began in the late 1960s with import substitution industrialisation effort after independent. The aims of this program were to

reduce import, save foreign exchange, create employment, and develop strong forward and backward linkages with the rest of the economy and transfer industrial technology. It was characterised as a period of protected promotion of local assembly. Cars from Germany, Sweden Japan and other European countries were brought into the country in parts (CKD) and during the period there were six assemblers involved. In 1971, the government decided to impose a policy, which required 10% local content for any car, assembled in the country starting in 1972 and later up to 35% in 1982 (*Jomo, 1993*).

The purchases of MAF vehicles were also in line with the government policy. Mercedes Benz 3 tonne trucks, used as Troop Carrying Vehicles (TCV), were supplied by Cycle Carriage Sdn. Bhd, a local assembler. MAF also used Volvo brand of vehicles in several variants provided by Federal Auto Sdn. Bhd, another local company appointed by the original equipment manufacturer (OEM).

The launching of national car project by Prime Minister Dr. Mahathir Mohammad in 1982 marked the birth of the nation's automotive industry. The first Proton Saga that rolled out of Proton plant in 1985 was the pride of the nation as a whole and in particular this infant national automotive industry, mothered then by Mitshubishi Motor of Japan. The privatisation of government official car service to Syarikat Spenco Sdn. Bhd. in 1995 made Ministry of Defence the biggest user of Proton's fleet of cars among

government agencies. When Diversified Resources Berhad (DRB) bought Proton-HICOM in 1996, the range of vehicles manufactured and assembled was later extended to include heavy trucks. In 1997 Malaysian Armed Forces received its first order of "Handalan" 3 tonne trucks from DRB -HICOM.

Malaysian automotive industry can be regarded as one of the sectors with vast potential for developing into the leading industry. Beginning with the import of CBUs in the early 60s, it later moved into assemblies as import substitution in the 70s. The national car project marked a great leap for local industry. From meeting the local needs, it has then developed into export oriented automotive industry. The market is not only confined to public and commercial sector but Proton has also penetrated into the government sector, the Armed Forces included, through the Treasury contract. Many models of different variants are being used in the Armed Forces and the Police.

1.6 CONVERSION AND INTEGRATION OF COMMERCIAL AND MILITARY TECHNOLOGY

The conversion and integration of commercial technology is of prime importance because of the disproportional part of industry and technological development devoted to the military, unlike in the USA or Russia or even Singapore. The conversion process and the integration of both technologies must go hand in hand. In the western countries, the relation between military

and civilian technology is relevant to the policy issue of how and to what extent military and civilian technological development should be integrated (Gansler, 1991). The main issues are as follows:

- How to maintain a sound defence industry in view of decreasing military budget, resulting in reduced equipment purchases?
- How to obtain a sufficient defence capability in view of an ever increasing cost of advanced weaponry?
- How to maintain a military R&D capability for the need of continuing equipment innovation and strive for technological superiority?

These questions can be answered by providing the similarities and differences between military and commercial technologies. Basically there is no difference between them. Technology is developed to increase human capabilities, which by nature are limited. Thus, in the protection of one's security, technology is used in making weapons and protective devices. The labelling of technology is then just a mere projection of nature of institutional setting in which it functions or is being developed, without the technology itself showing "military" or "civilian" characteristics. A number of historical studies have addressed the question of the relation between military and

civilian technology. Some of them have evidently shown that, in a number of cases, the military has successfully guided technological development in specific directions that have also penetrated the civilian sector. The study makes clear that a distinction between military and civilian technology cannot be made by just trying to provide sharp definition (*G D Will, 1997*).

Studies were also conducted under the heading of “dual-use” technologies (*Alic et al,1992*). The study reveals that to what extent the integration will be possible depends on the divergence in technological transformation toward distinct application. The closer to the “end application”, the more divergent these transformations will likely be. This is certainly true for the differences between weapons and civilian goods, but it also applies to such technologies such as civilian and military automotive and radar systems. Although they have many basics in common, different requirements of the end products lead to a different technological transformation in the development process. Thus the better prospect can be in the integration at the level of components. However, the one aspect that needs to be given utmost attention is the stringent military or security specifications imposed on the production of military equipment. This is due to the extensive and rugged use of military equipment that many commercial equipment fail to comply with. It then raises the question on whether the military should refrain from demanding too exotic specification of components

and modules and to adopt more commercial technology standard, which might result in reduced performance or reliability.

1.6.1 The Migration of Defence Technology into Commercial Sector.

The purchase of military equipment causes the flow of currency to foreign firms (*Mior Badri, 2001*). Economically, the outflow does not help in strengthening the nation's financial standing. Indigenous production of military equipment will enable the government to reduce this currency outflow, as the management of exchange rate is vital to the progress of the nation. It is through higher productivity and production of own goods that Malaysia will be in a better position to ensure a favourable balance of trade. In this aspect the local industries need to be more innovative, improve their technological capabilities and make products that are more competitive

The military technology development should also run parallel to the overall development of other sectors of the local industry. Since the defence industry is a lucrative but risky venture, a proper strategy is required for the industry to survive. The development concept needs to emphasise on the diffusion and the commercialisation concept of military technology to meet commercial need as illustrated in figure 1.3. Accordingly, the military technology development needs to be incorporated into the framework of

national technology development plan and integrated with the commercial industrial technology development. The areas where military technology can migrate into commercial technology are aerospace, marine, electronic and automotive industries. The present firms that are actively involved in these areas are able to provide the leadership.

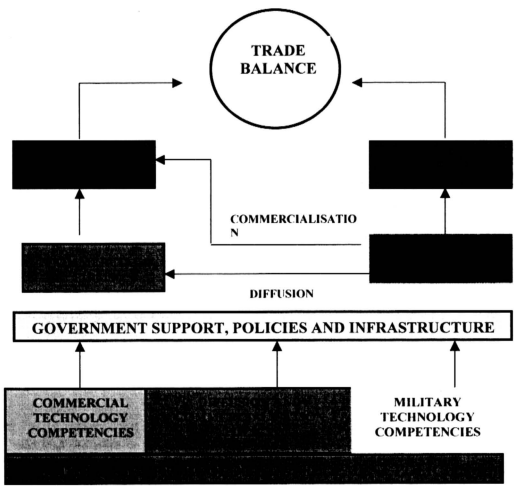


Figure 1.3: The Migration of Defence Technology into Commercial Sector

1.7 THE PROBLEM STATEMENT

With changing scenario in the management of war, the traditional ways of fighting battle with the human numerical strength are no more relevant. Malaysian army as the biggest arm of the Armed Forces is expected to wage a different type of war where high technology equipment is used extensively. A developing nation like Malaysia can ill afford to build a large defence industry as it is a very costly investment, with uncertain commercial success. Faced with this situation, the army has to turn to foreign manufacturers to purchase the equipment needs. However, the government cannot rely on foreign firms forever. There is an urgent need to achieve a certain level of self-reliance so that in time of crisis the nation's capability will not be held in ransom by the adversaries. The most important factor in tilting a balance between victory and defeat is the use of state-of -the-art land vehicles, which can provide the added advantage.

The contribution of the local automotive industry in providing vehicles required by the army is a positive move towards getting the industry involved in the defence of the nation. It is also clear that Malaysia had attained a small measure of self-reliance. However, DRB HICOM secured the contract for the supply of military vehicles through government initiative in protecting the local automotive companies involved in the defence industry. The contract

was awarded to the local company against well-established foreign names like Mercedes Benz, Volvo and Styer. In the process, some of the technical specifications peculiar to the military requirement had to be traded-off.

The underlying argument is whether the local automotive industry has the required technological capabilities to meet the defence requirement fully, without jeopardising the vehicle performance for war tasking. It should be noted that technical specification for commercial vehicles differ in many areas from military specification, which is more stringent and subjected to rough usage. The requirement is further compounded by the extensive combat use of armoured vehicles and tanks, as the technologies used in the systems are more complex and integrative. Various incentives and favourable policies provided by the government should be utilised to enhance industrial capabilities so that the army will be able to give preferences to locally produced systems and at the same time maintain the highest state of readiness.

1.8. THE AIM

This study tries to trace the development of local automotive industry and examine its technological capabilities in providing the Malaysian army the vehicles that meet their operational requirements. The study will focus

only on three companies that are very much involved in supplying and maintaining land-based vehicles, both soft-skinned and armoured vehicles.

1.9. OBJECTIVES OF THE STUDY

Mobility and firepower are two of the most crucial elements in land operation. The various types of vehicles, dedicated to their specific tasks provide these elements. The current government policy on purchases of assets requires the Ministry of Defence to give preference to local products. In addition, the privatisation policy dictates that a certain level of maintenance services is to be sourced out to private entity. Thus, the objectives of this research are as follows:

- To trace the development of local automotive industry in enhancing the technological capability
- To discuss the roles that local automotive industry should play in realising the desire towards "self-reliance".
- To study the strength and weaknesses of selected automotive companies in providing the vehicles that meet the army requirement in terms of reliability, availability and maintainability.

- To examine the linkages and integration between local defence automotive companies, the Ministry of Defence and foreign manufacturers in enhancing the technological capability of the defence industry.
- To find out the effectiveness of ToT programmes and what can be done to enhance them.
- To analyse the prospects of local defence industry especially in the automotive sector and to provide recommendations on the actions that need to be taken to further develop the technological capability of automotive industry.

1.10 METHODOLOGY

The research is conducted through collection of data, documentation and all relevant materials obtained from books, journals and other related publications. Most books on military technology are obtained from MINDEF Library, Malaysian Armed Forces Staff College, the Armed Forces Defence College and the University of Malaya libraries. Some data may not be obtained due to security reasons and high classification. However, efforts are taken to explain the overall situation without jeopardising security.

To obtain a first hand information on the technological capabilities of the local defence related automotive industry, a case study is conducted on three selected companies. These companies have been assembling and supplying both soft skinned and armoured vehicles, and also providing maintenance services to armoured vehicles. Interviews will be conducted on the management teams of the companies. Site visits will also be arranged to examine the facilities available.

Other sources of information include interviews with staff officers attached to the Army Headquarters – Logistic Branch and Headquarters of Army Logistic Command. In addition, the writer's previous and current appointments as commanding officer of the maintenance workshop and as staff officer at Army Headquarters will assist in providing a sound analysis on the subject.

1.11 SUMMARY

The nation's defence capability is important in ensuring that it can safeguard peace and stability. Since MAF structure is army-heavy, all efforts should be centred on equipping the arms with adequate mobility and firepower to produce a lean and mean force. With the government defence policy, which *inter alia* desires the nation to be self-reliant, the local companies should answer the call by building their technological capabilities

to manufacture defence hardware. One of the industrial sectors that have developed into a reputable standing is the automotive industry. A concerted effort from the government, the army and the industry will inevitably enhance the defence industry so that the nation will not be over dependent on foreign manufacturers for the supply of military equipment. The army can be the captive market for land-based vehicles such as the heavy duty trucks, all terrains and specialised vehicles and even tanks and armoured vehicles.

The study on technological capability of the companies is important as the vehicles engaged in operational duties are required to be at the highest degree of readiness to be deployed at all times. With an increase in the involvement of Malaysian troops in United Nations Peacekeeping Operation, the army needs to have the best equipment in order to face the adverse climatic condition and different terrain. It therefore, requires highly reliable and maintainable vehicles to accomplish the mission. Taking those points into consideration, the companies involved therefore, should possess an acceptable level of technological capability. The capabilities are not just confined to assembly and maintenance, but to include the manufacture and own design of vehicles.